# Network America's 1

**AUGUST 15, 1995** 

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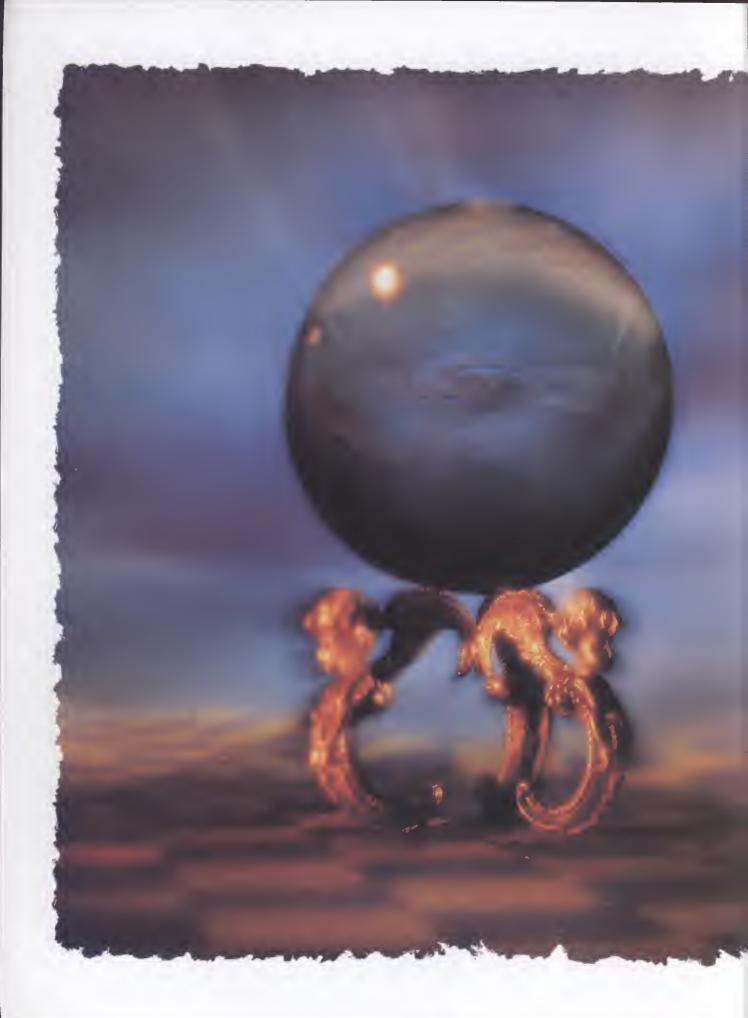
# Bells Look ABROAD

**PLUS:** 

**Bert Roberts on Competition** 

Let Them All Talk: Voice Over the Internet Goes Full Duplex

> Why the RBOCs Need to Get a Piece Virtual Transaction



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## **IMAGE IS EVERYTHING**

In "The Net," Hollywood's latest attempt to come to grips with the social impact of the computer and communications revolution, the network has run rampant. Sandra Bullock plays a world-weary network security expert who accidentally becomes the target of a band of corporate super hackers that have discovered a way to commandeer big institutional computer systems. By big I mean the airline industry, the banking industry and the Pentagon. Their method? They front a software company that markets an increasingly popular network security program.

The software has a secret trap door that permits the "Praetorians" to sneak in and take over. Sort of like if Windows 95 contained a security hole through which Microsoft could make changes to your vital accounts or otherwise irritate you to death.

In the movie, the Praetorians use this device to crash a plane, make a fatal change to a medication order and completely switch out identification records. In this paranoid vision of tomorrow's network, no one is safe and network gremlins are in charge.

Although this is a script designed to cash in on the public's appetite for horror stories, today's network providers should take note. The message that the network is potentially evil, or could fall into the hands of those who are, is gaining currency. It is the same fear that has prompted legislation to censor content on the Internet. The fact is, the network is socially and economically progressive. By giving customers control of content delivery, network providers are offering consumers greater freedom of choice. By providing the means for meaningful interaction, the network promotes new ideas and solutions.

But this is not the image presented by Hollywood and Capitol Hill. Perhaps the network challenges centralized control and therefore threatens these powerful institutions. Whatever the reason, network providers would do well to portray the network as an instrument of freedom and choice.

GE has tried this approach with its series of ads touting its ability to "bring good things to life." Certainly network providers, driven by individual end users, have greater authority to make this claim. But whatever form the message, it's time to start campaigning.

McCLOSKEY

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Video to the Desktop





**Better Prospects Over There?** 

AUGUST 15, 1995

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## **COMPETITION'S THE BEST POLICY** FOR CARRIERS AND CONSUMERS

Bert Roberts Jr. Chairman & CEO, MCI Communications

A little over 10 years ago, a federal judge broke up the world's largest telecommunications monopoly and launched effective competition in long distance.

That decision had an impact far beyond the field of telecommunications, accelerating a revolution in technology-and creating a wave of innovative services and products that use a common digital language. This digitization was a critical turning point in convergence because when industries began to speak the same digital language, old boundary lines lost their meaning.

Today, everybody is in everybody else's business. And for good reason.

The aggregate market for telecommunications, computing, software, cable, content and entertainment is worth more than \$700 billion. And the customers driving this mega-industry are wired and information-savvy.

In the last 24 hours, Americans bought more than 100,000 PCs, and American businesses have purchased more than 75 million to date. Last year, PC sales surpassed those of TV sets for the first time.

The really interesting thing is what people are doing with their PCs. Today, nearly 40 million individuals are connected to the Internet, and 160,000 join the ranks every month.

These statistics lead to one overwhelming conclusion: Customers have an insatiable craving for information, content and entertainment. But they would not have the many benefits they enjoy if we hadn't invented competition by challenging the telephone monopoly, including unprecedented innovation that has improved the quality and breadth of services.

Now Congress is poised to rewrite the 60-year-old Communications Act, thereby setting new ground rules for the future of competition in telecommunications. Proposed legislation is complex and will have a tremendous long-term impact not only on the many players in the information industry, but most importantly, on business and residential consumers.

competition.

But instead of doing what's best for their customers, RBOCs are exerting intense pressure to protect their local monopolies. Sure, they talk a good game, but when it comes to competition, they say one thing and do another.

Ameritech promised to open its network and instead erected insurmountable barriers to network interconnection, and to economic resale of local services.

SBC, formerly Southwestern Bell, armed itself with a force of more than 100 paid lobbyists and helped pass a law in Texas that effectively forbids local competition.

Pacific Bell refused business customers' requests to use the long distance company of their choice for shorthaul toll calling.

Bell Atlantic has resorted to scare tactics, claiming competition will hurt consumers, damage the quality of service and even eliminate jobs.

#### SAME OLD SONG

These arguments sound suspiciously familiar. They're the same ones the old Bell System used when it tried to prevent long distance competition more than 20 years ago.

The fact is, passage of a bill that ensures competition in the local market will mean lower local phone rates, higher quality and greater innovation. Effective competition will bring many positive changes that stimulate growth, jobs and new entrants in the market.

MCI, for its part, will continue efforts to give customers a choice where laws or regulations allow competition. That's because we believe the customer should be the winner of this contest.

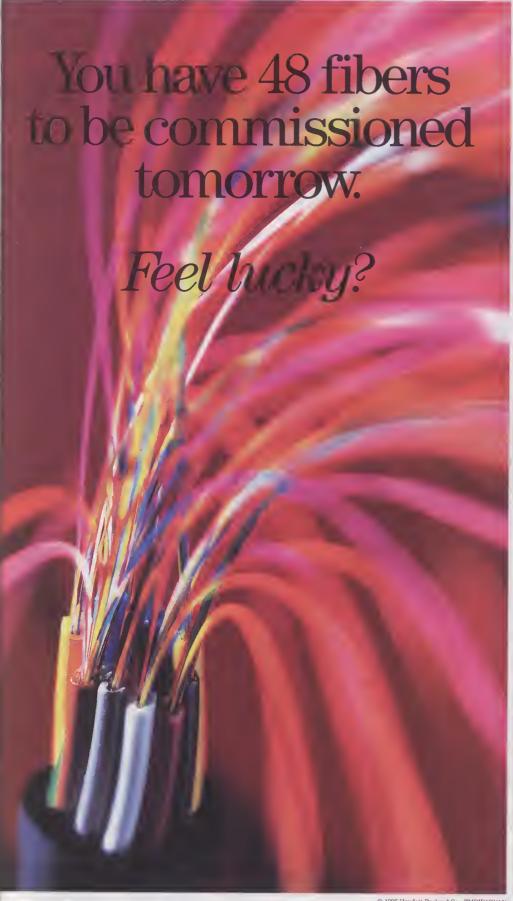
It is customers who stand to gain tremendous benefits from convergence in the information services industry, and from the advent of competition in local telephone markets. But the wrong rules could delay payoff for

Let's hope that the communications policy ultimately promotes rather than impedes competition. Those are the high stakes for which MCI is playing.

We've been blazing the trail into the Information Age with the knowledge and expertise gained through 27 years of pioneering new services and new markets. We've learned one lesson very well: competition is the best policy—for everyone.

And what will best serve consumers? Full and fair

Comments excerpted from a speech delivered to the Economic Club of Washington, Washington, D.C.



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# SONET CHIRPING IN NETWORK SIGNALS WAVELENGTH SHIFTS

#### Mark Dziatkiewicz, Technology Editor

Chirping birds may signal the break of dawn, but when Sonet lasers chirp—morning or evening—things are far from serene.

Laser chirp results from slight wavelength shifts, and it's not a desirable outcome. Laser chirp "comes from the fact that on a wavelength such as 1557 nanometers, there are slight wavelength shifts," explains Tom Radick, Hitachi product manager-OC-192. "The chirping is a characteristic of the actual wavelength and modulation."

"The word chirp comes from the very slight shift in wavelength," adds Dr. Yukio Nakano, Hitachi senior engineer-telecommunications division. "Chirping results when light turns off to on or on to off."

Lasers emit light at specific wavelengths. Fiber optic systems rely on lasers at 1310nm and 1550nm windows for optimal transmission. These lasers are turned on and off very rapidly—modulated—to represent digital transmission's zero and one pulses. And it's modulation that causes chirp. "Usually the wavelength will be a little bit shifted when modulation is applied. The wavelength may be 1557, but in the raising period there could be .1 nanometer shift [in either direction]," Nakano continues.

Slight wavelength shifts aren't problematic until pulses reach the receiving end. And fiber's chromatic dispersion is a primary culprit. "Chromatic dispersion of fiber is the difference of transmission time in the fiber for different wavelengths," he says. "1555 is a little bit slower than 1557, and the difference in speed is called the chromatic dispersion of the fiber."

Speed differences refer to pulse travel time through fiber. A laser emitting a stable wavelength results in pulses traveling uniformly through the fiber. But a chirping laser sends a single pulse composed of different wavelengths, resulting in different fiber travel time. "The effect is the pulse will be deteriorated after transmission if there's a large chirping and the fiber has large amounts of chromatic dispersion," Nakano concludes.

Chirping lasers are soundless, but pulse deterioration has a definite audible result—customer error complaints. Chirping contributes to high bit error rates affecting service performance. And where data transmission's involved, you're going to hear about it. "If there isn't any chromatic dispersion effect, the error rate depends on the

receive power," he says. "But if there is some deterioration due to chromatic dispersion and chirping, the error rate will be higher even if the receive power is high."

Laser chirp's not uncommon, nor are its effects always critical. When increasing from one transmission speed to another, laser chirp increase is proportional to the square of transmission speed increase. Moving from OC-3 to OC-12 increases transmission rate by a factor of four, while chirping increases by a factor of 16. But at lower wavelengths and traveling shorter fiber distances, chirping is not a transmission issue.

#### THE SPEED FACTOR

Not so at higher speeds. "When you get into a larger-speed system like OC-48 and especially OC-192, chirping becomes a very big issue," says Radick. "OC-192 is four times OC-48, so chirping effect is 16 times that of OC-48," adds Nakano. "So in the case of OC-192, it becomes a very big problem even if the span is not very big."

Dispersion-shifted fiber and external modulation solve most chirp-related problems. Dispersion-shifted fiber can reduce the wavelength delay difference by a factor of 17 at 1550nm, dramatically reducing chirp effect. But higher rates, such as OC-192, require external modulation.

Unlike direct modulation, external modulation doesn't turn a laser off and on; it creates ones and zeros through a shutter effect—like putting your finger in front of a light source to alternately block and allow light to pass. "In external modulation, you use two optical chips," Nakano continues. "One is the laser diode and the other is the modulator. The laser diode launches continuous optical signal power. The wavelength is very stable, so the chirping effect is introduced from the shutter effect." The chirping effect is still there but much lower.

Mach-Zender and EA are two external modulation techniques, says Radick. Mach-Zender modulation reduces chirp to one from a factor of five for directly-modulated lasers. "And then with EA modulators, chirping factors reduce to a range of .3 to .7," he adds. EA modulators provide cost savings as well because manufacturers can integrate the laser diode and modulator onto a single chip.

It may not be soothing, but controlled properly, laser chirp seems almost serene.

#### Chirp, Chirp

Chirping losers ore soundless, but pulse deterioration has a definite audible result—custamer error complaints. Chirping cantributes to high bit error rates affecting service performance.

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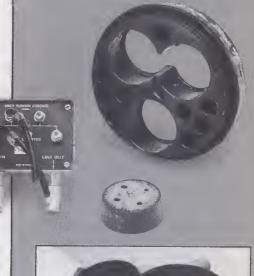
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## **HOME PAGE SWEET HOME PAGE**

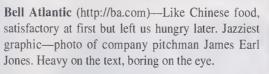


hese days, if you're not on the Net (or at least the user-friendly World Wide Web portion) you're nowhere. Companies are constructing home pages faster than you can type http://www, and the RBOCs are no exception. Because home pages serve as companies' first impression on the Net, we decided to judge these "books" by their "covers." After all, as one panelist noted, "If it looks boring, you're not going to want to read it."

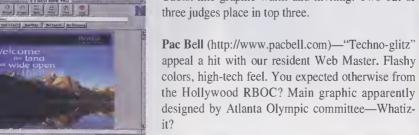




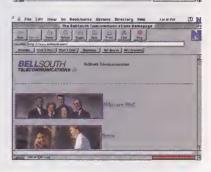
Note: Pages were viewed in random order using a 28.8 modem and Netscape browser.



Ameritech (http://www.ameritech.com)—Believers in less is more—entire page fits on one screen. Cubist-like graphic warm and inviting. Two out of three judges place in top three.







**Nynex, top left** (http://www.niyp.com/corp.html)—Very cool. Site seems under construction, but we liked what we saw. Funky icons give page a fresh, trendy feel. We'd go back again.

U S West (http://www.uswest.com)—Took longest to view thanks to 64k photo and really crappy computer equipment, but worth the wait. Breathtaking scenic pictures of U S West territory. A case of too much style over substance, though. Mountains are nice to look at but tell browser absolutely nothing about content.

BellSouth (http://www.bellsouth.com)—Nice try. Photos represent content categories much better than U S West's but "nothing grabs my attention. The photos are boring," noted one panelist. "At least they have pictures," countered another. You make the call.



Southwestern Bell (http://www.swbell.com)—And the last shall be first. "I believe we have a winner." Company uses drive-in theater marquee as lead image and cleverly continues the theme throughout in both text and graphics. An "A" for effort and style. Our unanimous choice for best RBOC home page.

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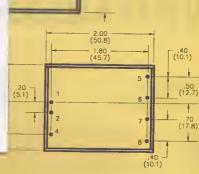
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Bell Atlantic (http://ba.com)—Like Chinese food, satisfactory at first but left us hungry later. Jazziest graphic—photo of company pitchman James Earl Jones. Heavy on the text, boring on the eye.

Ameritech (http://www.ameritech.com)—Believers in less is more—entire page fits on one screen. Cubist-like graphic warm and inviting. Two out of three judges place in top three.

Pac Bell (http://www.pacbell.com)—"Techno-glitz" appeal a hit with our resident Web Master. Flashy colors, high-tech feel. You expected otherwise from the Hollywood RBOC? Main graphic apparently designed by Atlanta Olympic committee—Whatizit?





Nynex, top left (http://www.niyp.com/corp.html)—Very cool. Site seems under construction, but we liked what we saw. Funky icons give page a fresh, trendy feel. We'd go back again.

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#### INSIDE WASHINGTON

# FCC SEARCHES FOR REASONABLE UNIVERSAL SERVICE FUND REFORM

#### Deborah Eby Washington Editor

CC Universal Service Fund (USF) reform is "one of the key issues of the '90s in transforming to a competitive environment," declares Royce Holland, MFS Communications president and COO. Large LECs and challengers agree the FCC must update a "well-intentioned but very outmoded" USF system. But small telcos fear the agency will strand remote subscribers by promoting competition that "isn't there, or isn't reasonable."

Funded through charges to IXCs, the USF subsidizes LECs in primarily rural areas where high service costs cannot be recovered reasonably through local rates. The FCC has proposed major reforms to update the system for a competitive local market (*see figure*).

Opening the USF to competitors dissolves "a bogeyman for the RBOCs to try to protect their monopoly. I don't think there has been one initiative that we have filed over the last seven years to knock down a regulatory barrier to competition that some RBOC hasn't screamed that it will bankrupt universal service."

IXCs also stand to gain from USF reform. If all common carriers contributed to the fund, IXCs would share the burden. And IXCs entering the local market could obtain USF funding as well.

The FCC must detail what services may be covered by USF support, cautions Chris Frentrup, MCI senior regulatory analyst, to prevent LECs from subsidizing competitive services with government funding. Large telcos stand to gain from USF reform, especially if they serve rural areas, phous averaging process" with assistance based on Census Block Groups and making all high-cost areas eligible for funding. Then large LECs can bring prices in competitive areas closer to costs without hiking rates to rural subscribers, he concludes.

#### **HAVOC IN THE HINTERLANDS?**

Jerry Anderson, general manager for Mid-River Telephone Cooperative, emphasizes the USF is critical to many telcos' survival. "Let's remember that the market I serve is a very thin market"—9600 access lines scattered across 28,000 square miles. Without the \$30-\$40 per subscriber line drawn from the USF each month, "there's simply no way our customers can afford the service."

Anderson is "very apprehensive" about any system that lets customers choose the USF recipient. "Food stamps don't build supermarkets. Credits to subscribers don't build telephone plant," he declares. Mid-River can't sink investment to reach a remote customer who then decides to switch to another carrier. "How will we recover what we put in the ground?

"If we have contrived competition, where somebody moves in because some individual subscriber can pay them, then we're dividing up that thin market, and I just for the life of me cannot see that that will work long term."

Anderson calls the \$726 million-per-year USF "a bargain" to keep high-cost areas connected and maintains the FCC's proposal to eliminate funding that totals less than \$1 per line is a "rational" way to trim costs.

The FCC's recent effort to step up telephone subscribership gives Anderson hope the agency won't create a competition-friendly USF that abandons high-cost subscribers. "I think there's enough people who understand the economics of providing telephone service in rural areas that a reasonable approach will be found," he concludes.

#### **UNIVERSAL SERVICE REFORM**

#### **USF** Critique

Untorgeted subsidy flaws to LEC

#### **Possible FCC Fix**

- Credit USF ossistance to subscriber line—custamer chaases corrier recipient
- Make USF ovailable to LEC competitors (subject to eligibility criteria)
- Calculate local costs based an Census Black Graup (400 hauseholds) rather than entire state

#### Na incentives for cost efficiencies

- Campetitive bidding far carrier of lost resort
- Colculate USF bosed on "proxy factors" (population density, distance fram central office, terrain, climate, etc.) rather than LEC casts
- Remove odministrative casts fram colculations

#### Uncontrolled USF growth

- Increose per-line cast threshald far eligibility
- Permonently cap USF size
- Eliminate subsidies less than \$1/line

Holland applauds removing LECs from their role as "tax collector for the industry. They collect all of the funds and distribute them with absolutely no regulatory scrutiny in most cases. Who knows what's happening to that money, how much subsidy is needed and how much is not?" points out Glenn Brown, U S West executive vice president-federal regulatory. Many LECs unable to qualify for the USF must subsidize high-cost areas by overcharging long distance, business and even some residential customers, he maintains. U S West wants to replace this "amor-

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#### EMERGING TECHNOLOGIES

## INTERNET VOICE IS HOT, BUT DON'T THROW AWAY YOUR PHONE

Vince Vittore
Associate Editor

he battle to run voice over the Internet is brewing, but don't expect the amorphous and ever-expanding Net to challenge telco networks any time soon.

In the early stages of what could become a large niche business, two comtively sophisticated hardware including a full-duplex sound card (or two standard sound cards), a minimum 50MHz processor and Windows 3.1 (Mac version later this year).

However, the software does not require a lot of memory. Internet Phone uses a proprietary voice compression algorithm to bring bandwidth consumption down to simultaneously with other Internet applications. Digiphone, by contrast, is designed as part of an overall package that includes a Web browser and interfaces for Telnet and FTP. Digiphone, though not shipping yet, will support more features out of the box, including voice encryption, conference calling, call screening and voice messaging.



INTERNET PHONE - The first cammercial full-duplex saftware far vaice aver the Internet is manufactured by VocalTec, which touts the Internet's lang reach.

panies are positioning themselves to take advantage of the Internet's long reach.

VocalTec, whose Internet Phone is the first commercial full-duplex software, says its product will allow users to call anywhere in the world for the price of a local call.

But like the early days of telephony, users on both ends must have the same software and be on line when the call is made. Additionally, both users need rela-

about 7.7 kb of raw audio data. By adding a separate voice compression card, users can reduce bandwidth further to about 6.72 kb of raw audio data.

A second company, Camelot publishing, is in the early stages of releasing its own version of voice over the Internet—Digiphone. But that's where its similarity to Internet Phone ends.

VocalTec's product is designed for voice communications only and can be run

#### **GLOBAL ACCESS**

With both software products, users with SLIP or PPP Internet accounts can speak to users anywhere in the world. Technically, there is no difference between an audio IP connection and a traditional connection, says Lior Haramaty, technical marketing director for VocalTec.

From the user's computer to the local service provider, the connection may be a dedicated line or dial-up. The call then is routed to other service providers just like a traditional Internet connection.

The software itself often is compared to the Internet Relay Chat (IRC) sessions that have been going on for years. However, Camelot stresses neither product relies on IRC's quirky infrastructure or arcane commands. VocalTec uses IRC's network but replaces the command structure with a Windows-based interface.

The two newest versions of Internet Phone and Digiphone take users another step closer to the quality of the public network. Previous versions of the software were limited to half-duplex conversations, allowing only one person to speak at a time. Full-duplex lets users speak without encountering the delays usually associated with half-duplex products. But if one end lacks a full-duplex sound card, the conversation reverts to half-duplex.

Though the goal is to let users speak as if they were using any phone, many users

continued on page 20

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#### **EMERGING TECHNOLOGIES**

continued from page 18

will experience everything from slightly better quality to adequate.

Digiphone even includes an option by which users can choose the level of voice compression. At the minimum rate, the company says users will receive noticeably better sound quality than if they were using standard phone lines. However, this may cause a time lag if the user does not have a 28.8 kbps modem.

At the maximum compression rate with a 14.4 kbps modem, quality is similar to an analog cellular call, the company says.

Internet Phone's voice quality is comparable to a high-end speaker phone, according to the company.

Haramaty notes that achieving public network quality may be difficult initially because there isn't a large installed base of computers with needed add ons.

To remedy such shortcomings, Vocal-Tec has signed a strategic marketing agreement with Netcom. Under the agreement, Netcom will provide Internet Phone as part of its NetCruiser package. The company likely will be signing similar agreements with other software vendors, according to Haramaty.

"We want to deal with everybody," he says. "Right now, we're trying to create our installed base."

#### LIKE AMATEUR RADIO?

Eventually, Internet Phone may be embedded into NetCruiser. Until then, both Internet Phone and Digiphone probably will be viewed as something like amateur radio.

The first time users log on to a service provider and run Internet Phone, they are connected to the IRC network and receive a list of on-line users and topics of conversation

To begin a conversation, users select a person from the list. First-time users automatically are placed into the "general" topic, similar to placing a random call out on a CB radio and waiting for someone to respond.

Experienced users can set up their own topics and list some as private, available only to those on a pre-defined list.

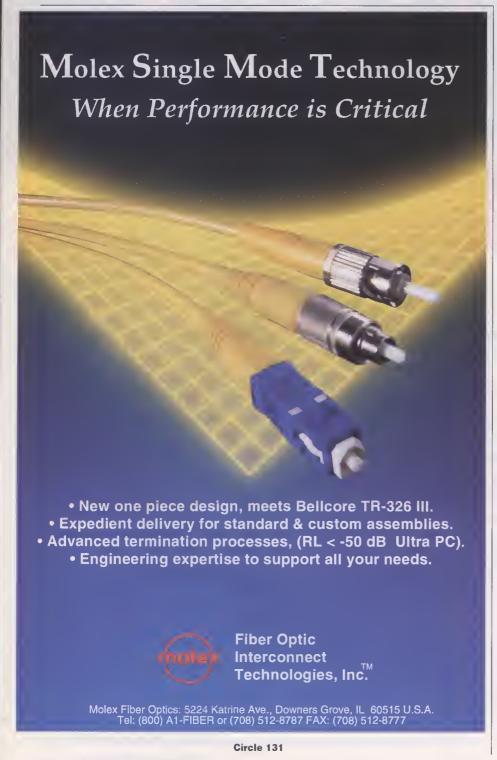
Digiphone and Internet Phone may change significantly as users become more accustomed to their use. However, affordability likely won't change. Both companies plan to continue marketing the overall cost benefits of using the Internet for voice communications.

Digiphone, the more expensive of the two, will retail for \$150. VocalTec sells a retail version of the full-duplex Internet Phone offering for \$99 with an expected street price of \$69. The company also is providing free upgrades to half-duplex

"The cost performance issue is crucial here," says Haramaty, emphasizing the fact there are no distance-based charges for using either product.

Eventually, even that may change if either company develops software that allows users to call non-Internet users. VocalTec has considered it in the past, but is staying quiet about its plans for the moment, Haramaty says.

"We have users that are doing it unofficially," Haramaty points out. "We have also had some hook it up to amateur radio equipment. We have a lot of different uses."



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  14 ☐ Lagaret Managemant (Chairman, Owner, President, Partner, Executive/Sentior VP/Director, Treasurer, CFO, COO)

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  | BallSouth
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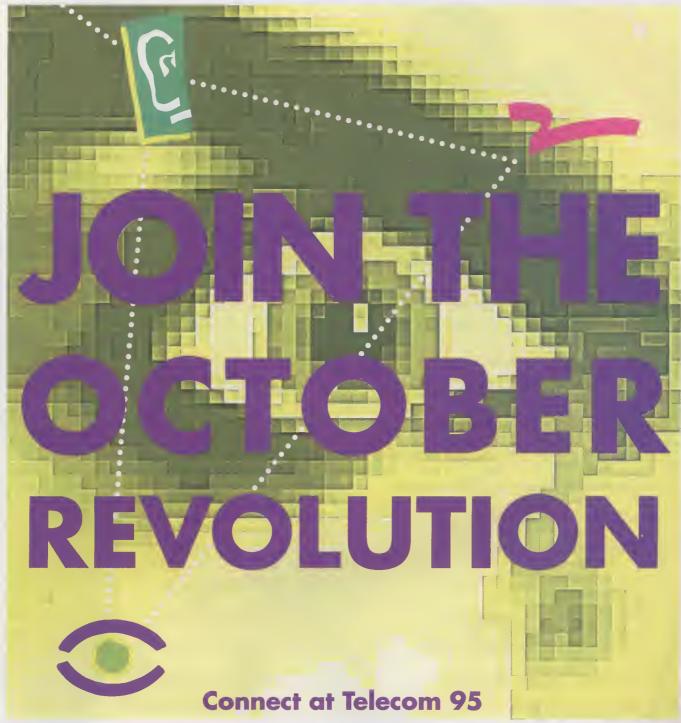
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VEHICLE LOCATION - Geotek's service could be especially attroctive ta pubic safety users, a key SMR market. Users histarically sent out a broadcost to locote vehicles. Naw dispatchers can see which vehicle is handlest ta respond.

■ WIRELESS TECHNOLOGY

# GEOTEK BANKS ON FREQUENCY HOPPING

The specialized mobile radio provider plans to use proprietary technology and customer service to woo business subscribers.

Eric Krapf Managing Editor

raig McCaw may have made a bigger splash with his investment in Nextel, but specialized mobile radio (SMR) rival Geotek plans to distinguish itself with unique technology and strong customer focus.

The company claims its proprietary air interface—frequency hopping multiple access (FHMA)—will outperform rival technologies and has the pedigree to back up those assertions. The president of Geotek's Wireless Technologies Division,

George Calhoun, is a "digital pioneer," notes Andersen Consulting analyst Richard Siber: "From a technology standpoint, they certainly have the credentials."

Geotek also has a solid track record as an international carrier, with operations in the UK and Germany and a stake in other European networks. "They have had very strong success outside the United States," Siber says.

Now they're going after an estimated 20 million mobile-workforce users ripe for wireless niche services. The company recently exhibited applications such as dispatch, automatic vehicle location and cred-

it card validation at a Philadelphia Chamber of Commerce small business show and netted 250 users for its first U.S. market trial. And though he considers that number small for a market trial, Siber says it "is in line with the Geotek culture: keep it simple; control our destiny."

That destiny is bound up with the performance of the new air interface. President and CEO Yaron Eitan told a press conference FHMA has proved out and will provide top-quality transmission: "There's no more technical risk associated with this company."

Siber is inclined to believe Eitan and con-

trasts Geotek's approach with Nextel's, which was plagued by early reports of technical glitches. Nextel was very ambitious in its rollout plans, Siber says. "They were hoping the technology would catch up with them." On the other hand, "the Geotek approach for years now has been to make sure the technology is there first."

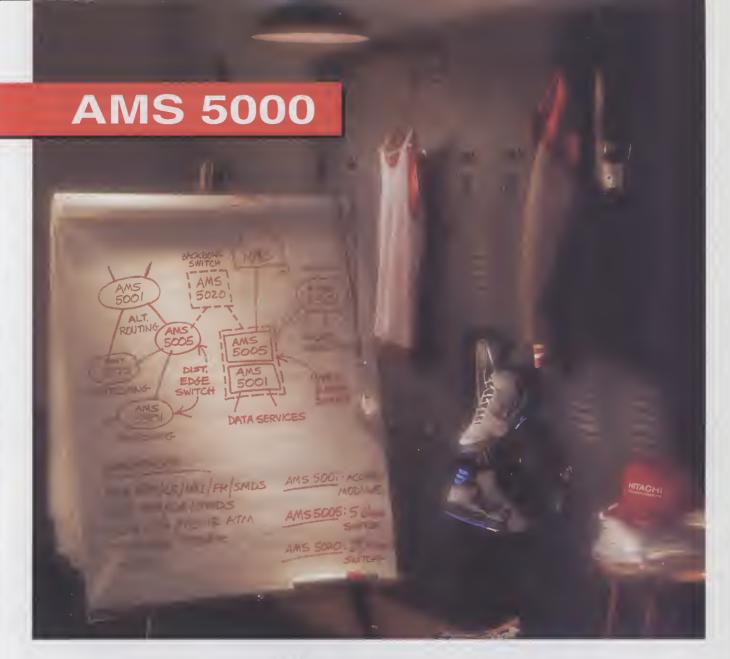
Eitan acknowledges Nextel as Geotek's biggest competitor, but both companies stress differentiators, starting with their approach to SMR and its image. Though its network operates on SMR spectrum, "we're certainly not SMR, nor are we ESMR," says Bob Klass, Geotek's director-marketing for wireless data.

By contrast, Nextel embraces the traditional SMR market—with 750,000 analog dispatch customers already in hand, it hardly can do otherwise.

"That's an enormous heritage," Nextel spokesman Paul Blalock says proudly. "We are the predominant SMR player."

But Nextel says it's making inroads on the new SMR market of integrated services for business, claiming 37,000 Digital Mobile units in service as of June 30, an

continued on page 28



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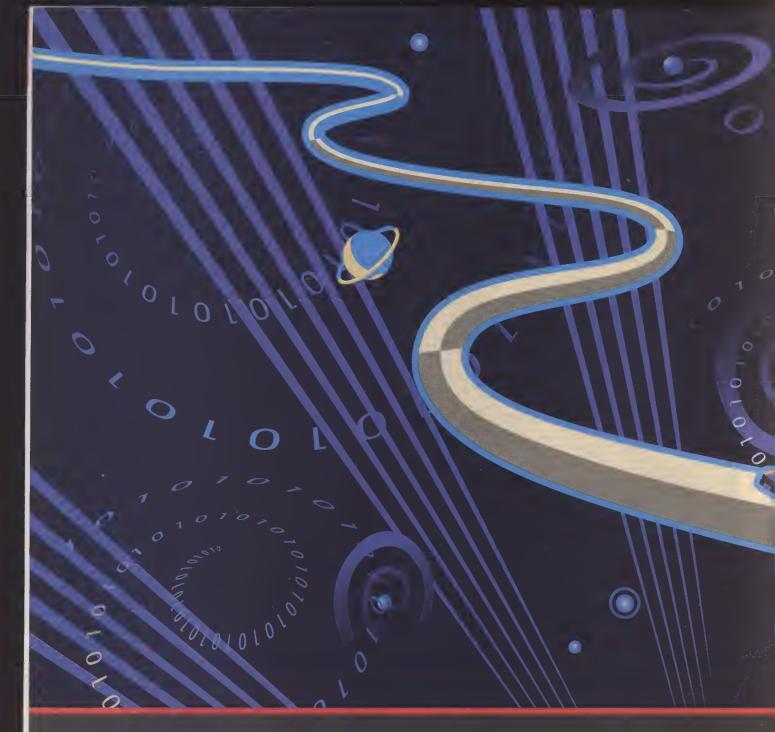
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#### GEOTEK

continued from page **24** increase of about 14,400 units in three

Both companies have substantial reach, though Nextel has a jump on its buildout. The company is "actively loading customers" onto networks in Philadelphia, New York, Chicago-Milwaukee, California and Detroit, Blalock says. Nextel's recently-acquired Dial Call subsidiary is on line in the South from Birmingham, Ala., to Raleigh-Durham, N.C.; and its OneComm subsidiary has turned on in

Denver, Seattle, Portland, Ore., and six

Midwestern cities in Kansas, Missouri and Oklahoma.

"We're national, we're here, we're on," Blalock says.

Geotek expects to build out five markets in 1995 and "try very hard" to turn up commercial service in three markets by yearend, according to Eitan. A recent debt offering raised \$100 million that should fund service rollout throughout the Northeast, Florida and a couple other markets. By 1997, Geotek expects to be positioned to serve two-thirds of the nation's businesses; it owns spectrum in 36 major markets, with one glaring omission—

HARDWARE - Workstatians, as Geatek calls its system's terminols, won't cost more than campeting praducts ar analag SMR radias. Terminals will cast hundreds, nat thausands, af dallars. Beta custamers pay \$30 a manth far equipment and services.

unlike Nextel, Geotek lacks spectrum in Los Angeles.

Geotek's network is ahead of Nextel's on at least one potentially valuable service offering—vehicle location. Siber says this service could be especially attractive to public safety users, a key SMR market. "Historically, [such users] sent out a broadcast saying, 'Who is in the area of...?'" Siber notes. Now a dispatcher can see which vehicle is handiest to respond.

And though Geotek isn't targeting the consumer market yet, Siber believes vehicle location could be a nice add-on for \$5 or so a month—an "incremental cost that is marginal for a high-value service."

Another difference: while Nextel's system, built by Motorola, was proprietary until just a few months ago, Geotek is starting with open interfaces. Mitsubishi, Hughes and Kenwood already are building to Geotek's architecture, and Eitan says his company will encourage developers to write applications for its network.

Eitan says workstations, as Geotek calls its system's terminals, won't cost more than competing products or analog SMR radios. Terminals will cost "not in the thousands but in the hundreds of dollars." Beta customers pay \$30 a month for equipment and services.

The company also has awarded a \$40 million multi-year contract to IBM to build out the network. IBM will provide turnkey site construction and project management for about 200 base stations.

But the most crucial relationships will be those Geotek builds with the small and medium-sized businesses it's defined as its niche. Klass says exhibiting at the Philadelphia chamber show was an example of Geotek positioning itself with the end user rather than the industry.

"That's been the problem. Companies haven't rolled up their shirt sleeves. They haven't gone where their customers are, the trade shows they go to," Klass says. "We want to be extremely accessible."

Siber agrees Geotek has a strong customer focus, oriented toward "shaking hands and kissing babies. If that's what they have to do to capture this market, it's not beneath them."

HOW FHMA WORKS

#### NO HOLES HERE

Think of spectrum as a bagel and you'll see why Geotek believes its FHMA technology will outperform other digital standards.

Both FHMA and CDMA are based on spread-spectrum principles, explains Geotek technology vice president Oliver Hilsenrath. The difference: FHMA transmission can jump around on a channel and thus doesn't share CDMA's requirement for large amounts of contiguous bandwidth.

"You just smear [the transmission] just like you'd smear butter on a slice of bread," Hilsenrath explains. "If you have a hole in the middle, butter is going to end up on the table." Unlike CDMA, FHMA avoids the holes.

CDMA's generous spread isn't a problem for larger, contiguous PCS spectrum blocks, Hilsenrath acknowledges but maintains CDMA is less backward compatible with smaller cellular and SMR allocations.

Like other digital standards, TDMA-based FHMA is highly secure, Hilsenrath notes. Each call is assigned a TDMA channel but hops among frequencies within the channel.

And like TDMA, FHMA was adapted from military systems, in this case Israel's. Potential eavesdroppers must break the time division security and also need the frequency hopping key by which a particular call is sent. And that key changes about every two seconds. "Every time you're silent and then you start to talk again, a new key starts," Hilsenrath explains. "It's practically a random process."

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#### **GEOTEK**

continued from page **24** increase of about 14,400 t

Both companies have substantial reach, though Nextel has a jump on its buildout. The company is "actively loading customers" onto networks in Philadelphia, New York, Chicago-Milwaukee, California and Detroit, Blalock says. Nextel's recently-acquired Dial Call subsidiary is on line in the South from Birmingham, Ala., to Raleigh-Durham, N.C.; and its OneComm subsidiary has turned on in Denver, Seattle, Portland, Ore., and six

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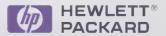
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## TELCOS WEIGH MERITS OF JUMPING INTO VIRTUAL TRANSACTION ARENA

The RBOCs know there's money to be made in electronic commerce but aren't sure where to look for their pot of gold.

Vince Vittore
Associate Editor

elco radar screens are crowded with potential new services. Few are worth tracking, but some, like electronic commerce, merit a second look.

Doug Bulleit, BellSouth Corp.'s chief strategist, thinks telcos might wind up losing money if they don't start surfing for dollars—soon.

More consumers are conducting transactions via the PC, tying up phone lines longer than traditional voice calls, he explains, costing a flat-rate-oriented company tike BellSouth potential revenue. "We might have a huge capitalization problem if we're not players" in the electronic commerce arena, Bulleit worries.

By partnering with companies such as Citibank (which Ameritech has done), telcos could take a cut of virtual transactions, recouping some of that lost revenue and perhaps turning a tidy profit. Because there's certainly money to be made in cyberspace.

"Maybe only 10% of the people are ready for this, but they're the key ones, the power users," says Ron Reeve, senior principal in the financial industry group of AMS, which earlier this year set up a lab to study issues affecting electronic commerce.

Michael Katz, manager with Price Waterhouse's Technology Center, concurs, adding that a recent report from Forrester Research estimated business transactions over the Internet alone—which is just a small slice of the electronic commerce pie—could reach \$4 billion by 1998.

#### THE TWO-PART TRANSACTION

Telcos can smell money, they just don't know where it's at—either the front or back end of electronic transactions. There's the actual purchase (the front end) and debiting an account (the back end). For bill payment services such as Checkfree, the person authorizing payment

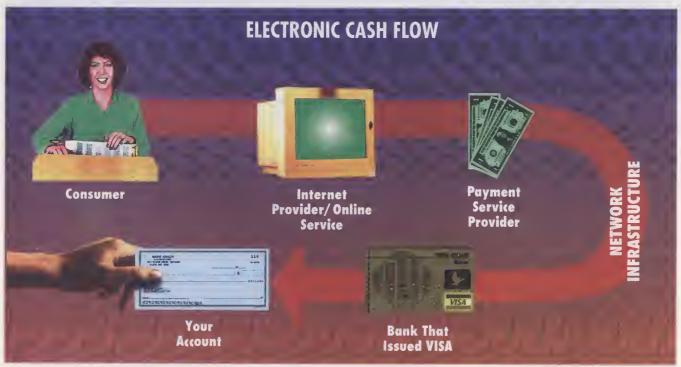
of a Visa bill, for example, constitutes the front end. Debiting the payer's checking account and paying the card-issuing bank is the back end.

BellSouth likely will become involved on the front end and work as a co-brander with third parties and as a network provider.

"Our strategy will tend to be more horizontal," says Bulleit. A number of the company's vertical projects didn't pan out or showed less than spectacular growth. "[We want to] upgrade the capabilities of a lot of products so PCs can become nothing more and nothing less than more powerful devices hooked up to the network."

Mark Dye, director-product development at Checkfree, agrees with Bell-South's strategy. He believes telcos aren't well suited to the back end of transactions and should focus on the front end, where customer contact can be maintained.

"That front-end contact is essential to continued on page 34



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## **ELECTRONIC CASH**

continued from page 32

keep that customer relationship," says Reeve, adding that telcos could get involved in joint marketing efforts with on-line service providers to offer bill payment. "That's a real opportunity. Quicken has really driven that, and that could be provided by a telco."

AT&T seems a natural to jump into the bill payment business, sans partner, since it runs one of the largest credit card operations in the world. "I can't believe AT&T is doing that just because they think the credit card business is such a good business," says Katz.

Still, there are many issues that telcos and cable companies must deal with before diving into electronic commerce.

Perhaps one of the most important is consumer confidence. Despite recent advances in encryption technology, most consumers remain leery of sending credit card and checking account numbers over computer networks. Most of these same consumers, however, routinely divulge their credit card numbers while using cordless phones, says Katz. "It's sort of interesting

how people put a higher requirement on computers than they do on themseIves. That's just a cultural thing."

Paul Turner, a partner in Price Water-

payment-oriented services. Most recently, Bell Atlantic Mobile teamed with Firstnet Corp. to offer merchants in the Washington, D.C., Baltimore and New York City areas a

> service that lets them verify credit card numbers over a cellular digital packet data network.

And even cable companies are starting to look into electronic payment services.

"I don't think it's time to rule out anybody in any of this yet," says Katz, adding, "none of the boundaries that we have thought of as sacrosanct will exist."

Reeve and others, however, emphasize the time to act is now, even if carriers are unsure which direction to take. "It's so broad, all the players will have a role. I think the telcos have a major question to answer: What part do they want to be into, and how?"

# MAYBE ONLY 10% OF THE PEOPLE ARE READY FOR THIS, BUT THEY'RE THE KEY ONES, THE POWER USERS. RECENT RESEARCH ESTIMATES THAT BUSINESS TRANSACTIONS OVER THE INTERNET ALONE COULD REACH \$4 BILLION BY 1998.

house's Technology Center, adds that some people hesitate to conduct transactions on line because of press reports about corporate break-ins via the Internet. "We're just at the point for people to begin to get comfortable with it."

That hasn't kept anyone from experimenting, though.

Within the past three years, carriers including MCI, Bell Atlantic and Ameritech have begun trialing or offering electronic

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## BELLSOUTH GOES FOR THE GOLD

RBOC readies network for Olympic onslaught.

Eric Krapf Managing Editor

he Olympic flag has five rings; BellSouth will have 18 rings for next year's Games.

Eighteen Sonet rings form the backbone of the \$50 million private network BellSouth is building to serve 150,000 athletes, coaches, trainers, officials and others affiliated with the 1996 Atlanta Games. And while it builds the Olympic network, the RBOC also will roll out services and promote telecommuting to ease the burden on businesses during the Games' 17-day run.

## TELECOMMUTING

Officials expect 300,000 visitors to jam metro Atlanta daily. Streets and expressway exits will be closed and commutes transformed into marathons for the 100,000 natives who work in the 1.5-mile area of central Atlanta that will serve as the hub for much of the Olympics.

Like Pacific Bell after the Northridge earthquake, BellSouth will promote telecommuting to relieve physical

infrastructure strain, with the hope its efforts will result in long-term telecommuting gains.

The company's slogan for its SecondSite telecommuting program is "For the Olympics...and Beyond."

BellSouth expects to increase both Basic Rate and Primary Rate ISDN circuits in several wire centers; exact projections on likely telecommuting volume still are being worked out, according to Marc Hayes, director-Olympic coordination for BellSouth Telecommunications.

Demand for telecommuting services has



RAVE REVEIW - Olympic mascat Izzy and John Clendenin, BellSouth chairman, president and CEO, give the telco's Olympic efforts on enthusiastic twa thumbs up.

been rising even without the Olympics. "You don't have to stimulate [demand]," Hayes says. "That has become a natural phenomenon."

Traffic's likely to be just as heavy on BellSouth's network as on Georgia's highways. The RBOC has plans for dealing with volumes Hayes estimates could jump as much as a million calls a day. Hayes notes corporations and media outlets already plan a major presence. Ford Motors is buying and renovating a downtown hotel for its VIP guests; NBC is taking over another hotel; Coca-Cola is building a new 12-acre park.

Factor in all those tourists phoning home and ordering out for food, and there could be a need for as many as 90,000 new public network lines, according to Hayes.

But Atlanta business people can rest easy, he's quick to add. BellSouth is promoting three already-tariffed services and a new offering designed to ensure reliable transmission and offer maximum options for call routing.

The RBOC is promoting its existing Sonet services for network reliability, as well as an offering that lets leased-line customers handle configuration management and alarm surveillance themselves.

BellSouth also is introducing Crisis-Link, an AIN-based service that lets subscribers call in and have telephone traffic re-routed to pre-determined alternate lines.

That's "outside the fence." "Inside the fence," as BellSouth calls Olympics facilities, the RBOC will have a private network comprising 11,000 dialtone circuits, 1000 ISDN lines, 6700 private lines and 500 video loops.

BellSouth has three key vendors for the private network, according to Coleman Bentley, manager-Olympic coordination/network design. AT&T Network Systems is supplying next generation digital loop carriers, OC-3 and OC-48 multiplexers; Alcatel and Nortel are providing video codecs.

## RECYCLING THE NETWORK

All necessary interoffice fiber already is in place, according to Hayes. In addition, fiber already runs to existing venues such as Fulton County Stadium. Distribution fiber still must be run to venues not yet completed.

Hayes expects to turn up the OC-48 rings by the end of January and says the whole network will be in place and ready for testing by May 1996.

What do you do with a \$50 million network once the Games finish? Most of the equipment will be distributed throughout BellSouth territory, primarily in Atlanta. "There is no throwaway here," Hayes says.

"It is all basic telephony equipment that fits nicely into our plans," he adds.

"It's money we would have spent anyway."

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## READY, SET, CATV

Eric Krapf Managing Editor

ranchise in hand, BellSouth is set to build out its first cable TV network, in Daniel Island, S.C. Now all the RBOC and Daniel Island need are houses and people.

Construction on the new development's first 361 homes should be completed in February 1996, and BellSouth will be ready with parallel fiber-to-the-curb and hybrid fiber/coax networks providing telephony and video respectively. The developer plans 7000 homes on the 4500-acre site, which lies within Charleston, S.C.

Though BellSouth has held discussions with officials in suburbs of Birmingham, Ala., and Nashville, Daniel Island is its first cable franchise. Like Ameritech, BellSouth is weighing video dialtone versus cable provider status. With no incumbent cable

provider or embedded outside plant, Daniel Island was "sort of the right time and the right place for us" to get hands-on experience as a cable company, says BellSouth spokesman Kevin Doyle.

The RBOC opted for parallel networks because it plans to debut traditional cable service, not a full service network, says John Galligan, manager-network planning. FTTC is the RBOC's preferred telephony architecture for new builds, he adds.

Daniel Island won't have its own central office; fiber will run from BellSouth's nearby Mt. Pleasant wire center to a hut at Daniel Island, Galligan explains. The hut will house the host digital terminal for telephony and distribution electronics for video, receiving signals from an adjacent cable headend the RBOC will build.

From this main hut, telephony and video distribution fibers will run in the same sheath until split off—telephony fibers con-

tinuing to curbside optical network units (ONUs) serving six homes, and cable fibers continuing to fiber nodes serving 500 homes, Galligan says. Wherever possible, BellSouth will trench coax from nodes together with fiber to ONUs.

Unlike Pacific Bell or Bell Atlantic, BellSouth hasn't committed to a system-wide advanced-services architecture, though its Chamblee, Ga., interactive trial begins early next year. Doyle stresses that while Daniel Island likely will be a learning experience, it's not a trial. BellSouth formed a subsidiary, Daniel Island Cable, to run the cable side of the operation.

"What we're really interested in on Daniel Island is pressing forward on the cable model," Doyle says.

Comcast already holds a citywide franchise for Charleston, meaning it could go into Daniel Island and compete with BellSouth, according to Robert G. Clawson Jr., the city's assistant corporation counsel. The city grants no exclusive cable franchises and also welcomes competition for telephone service once legislation passes.

"Our city would tend to do things that are pro-competitive," Clawson says.

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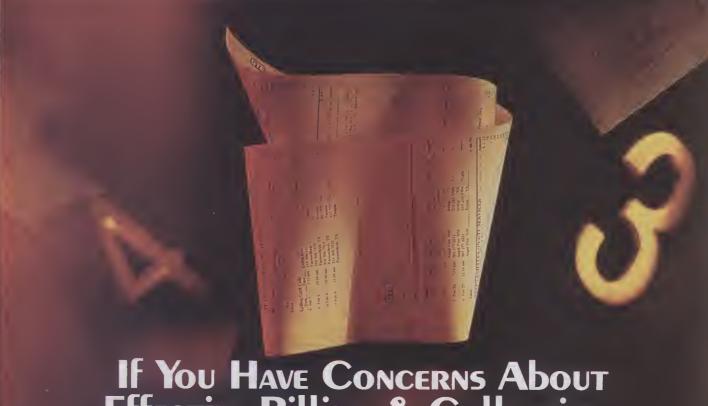
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■ WIRELESS MESSAGING

## MOBILECOMM TESTS WATERS ON TWO-WAY MESSAGING

Carrier prepares market for PCS services.

Patty Wetli Associate Editor

hile MobileComm deploys and builds out its narrowband PCS network, the company will borrow RAM Mobile Data's network to conduct a market trial of two-way wireless messaging services.

"Forget about pagers," says a RAM



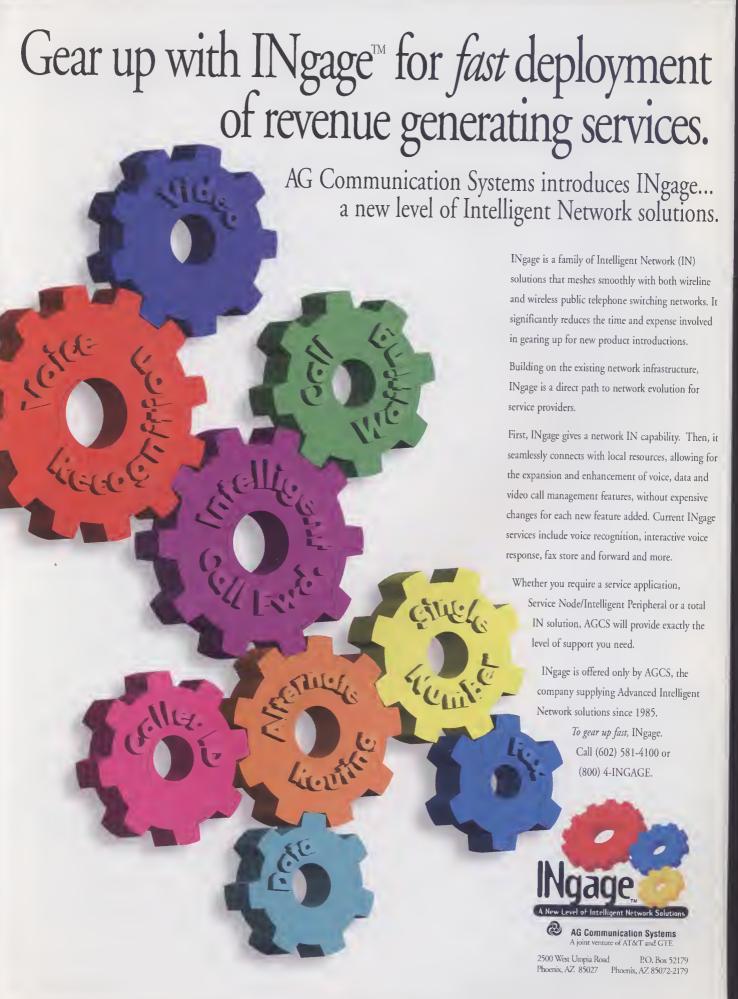
SILENT RESPONSE - No more interrupting meetings with cellular calls; response messaging is just as effective.

spokesperson. The two BellSouth affiliates will emulate a narrowband PCS environment "to show customers what's coming."

And to find out what customers want. Jean Coppenbarger, MobileComm spoke-sperson, emphasizes this is a market, not technology, trial. "We know what the technology is," she explains. The company doesn't know what services customers will find of value or what they'll pay for those services. "Those are some of the things we want to ask."

For the trial, MobileComm has equipped "real, live paging customers" with Motorola's InfoTAC two-way messenger. The device is larger than traditional pagers, weighing in at more than a pound. "It's not intended to be worn," Coppenbarger notes, "but it is a portable

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## **MOBILECOMM**

continued from page 44 messaging unit."

Messages are dispatched to the device and the user replies by choosing from a menu of preprogrammed responses. Subscribers can customize these "canned" acknowledgments, which could range from a simple "yes" or "no" to "I'll be home in an hour."

The ability to respond immediately will be promoted most heavily versus one-way paging. "It's two-way communication," notes the RAM spokesperson. While responses may be limited, it's still a "step up from one-way paging."

THERE IS A NEED WHERE A
GAP EXISTS BETWEEN
PAGING AND CELLULAR.
MOBILECOMM'S STRATEGY
WILL BE TO DIFFERENTIATE
FROM CELLULAR. WE NEED
TO STAND ON THE STRENGTH
OF PAGING.

Analysts agree. "Absolutely there's a market out there for this," says Dorothy Salmon, paging analyst with D.C.-based MTA-EMCI consultancy. Even if the "ack back" is a short yes or no, that message adds value to traditional paging because it is immediate. She also notes that while two-way messaging doesn't substitute for real-time conversation, it is cheaper than cellular and often can accomplish the same end, cutting down considerably on a user's cellular bill.

"There is a need, we believe, where a gap exists between paging and cellular," says Coppenbarger. MobileComm's strategy will be to differentiate from cellular. "We need to stand on the strength of paging" and emphasize the importance and convenience of sending a brief reply, she explains.

For example, Coppenbarger notes an individual might not want to answer a cellular call in the middle of a meeting, but could fire back an acknowledgment message unobtrusively.

continued on page 48

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## **MOBILECOMM**

continued from page 46

MobileComm initially will focus on these types of "vertical applications for business use," she says. Salmon believes such a strategy is a smart play. "The business user is a little bit less price sensitive" and may be more willing to pick up the estimated \$69 monthly tab, she notes. And they're more apt to take to InfoTAC-type devices. Considering many already tote around hefty laptops, they won't consider beefier messaging units burdensome, she says.

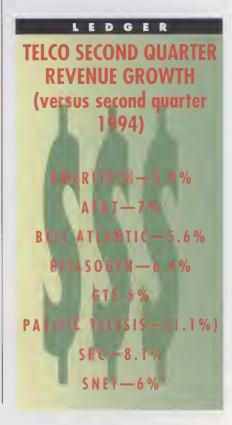
But she quickly adds the consumer segment is not to be ignored.

"I don't think it's possible to survive" appealing to niche markets alone, Salmon asserts. If you're going to have a business product, you need to offer something to consumers as well.

Coppenbarger agrees. "We wouldn't have paid \$47½ million" for licenses if they didn't intend on reaching the masses. She says MobileComm will address the consumer market, but it probably will take "several years."

Ultimately, there will be a "shakeout" in the market, she believes. Consumers won't care if services are delivered via "narrowband, broadband or tin cans with a string."

And you can bet at least one company's banking on two-way messaging.







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## INTERNATIONAL

## Bels Look ABROAD

Europe and Latin America are promising, but the big prize is China.

## **Arielle Emmett**

nstead of frenetic deal-making and opportunistic grab bagging wherever telecom possibilities arise, the RBOCs are concentrating abroad on what they do best at home. And whether their specialities are cellular or land lines, advanced network infrastructures or delivery of interactive multimedia services, U.S. ventures abroad are likely to spell big returns as competition increases and foreign countries open up new markets to investors worldwide.

Globalization no longer is a prediction but a hard-and-fast reality. As international networks for voice, data and video grow exponentially in Europe, the Far East and Western Hemisphere, the Bell operating companies are abandoning regionalism for strategies that leverage internally-developed strengths abroad.

"The RBOCs' long-term plans are maturing," says analyst Frank Governali, director-equity research at First Boston. "Five years ago, the Bell companies were dabbling in international markets that were just becoming competitive and opening doors to foreign investments. Today, most developing markets are open to foreign investment, particularly on the wireless and wireline side, where Bells are being invited to utilize expertise to develop network infrastructure."

Examples abound of successful investment abroad:

- SBC Communications, formerly Southwestern Bell, invested \$1 billion in Telmex (Telefonos de Mexico), which serves 91 million customers in Mexico and is launching aggressive cellular, digital conversion and rural access programs. Telmex increased access lines 11.4% in 1994; that growth, along with cellular and other ventures in South Korea and France, helped SBC deliver the highest shareholder return on investment (640% total for 11 years) among all Bell companies.
- In Thailand, Nynex is leveraging its expertise in advanced intelligent networks to help build a 2 million-line network expansion in Bangkok through a joint venture, TelecomAsia Corp., undertaken with a local Thai partner. TelecomAsia Corp.

also will deploy Thailand's first cable television network.

- In New Zealand, Ameritech and Bell Atlantic are enjoying the benefits of privatization and deregulation through joint ownership (with a group of private New Zealand investors) of the Telecom Corp. of New Zealand, now experiencing 17% annual growth, higher prices for services—and no competition.
- In Denmark, Spain, Portugal and Japan, among others, AirTouch International is building and operating successful cellular networks.
- BellSouth International is partnering with the UK's Cable & Wireless and Australian investors to operate Australia's second telecommunications carrier, Optus Communications, which delivers domestic and international long distance service, cellular and personal communications. A new company, Optus Vision, will deliver phone service, pay TV and, by 1998, interactive services to half of Australia's homes.
- In the UK, U S West is capitalizing on its cable/telephony strengths to build

TeleWest, a full service public cable company incorporating the expertise and financial resources of U S West, Time Warner and Tele-Communications Inc. (TCI). The new company will be the largest of its kind in England. One of its goals is to use lessons learned abroad to help U S West enter new U.S. cable markets (i.e., Atlanta) more profitably and efficiently.

• GTE, the fourth largest publicly-owned telecom company in the world, contracted to build a nationwide cellular system for Argentina (except Buenos Aires). The company also is selling Airfone air-to-ground communications in China, directory yellow pages to Belgium and data-centered billing systems around the world.

## SPECIALIZATION IS KEY

American companies are leveraging specialized knowledge and hard-earned geographic advantages to win international contracts, according to Walt Catlow, executive vice president at Ameritech.

"The RBOCs and GTE especially are more active in seeking international business of all types than they were four or five years ago," he says.

"Although some companies appear to be fairly quiet at this point, the RBOCs have a more defined strategy now; they're not doing as much opportunistic investing," Catlow maintains. "Instead, you see merging directions centering around type of geography or technology specialty.

"For example," Catlow continues, "U S West is specializing in cable. Even though the company does other things, it has now become one of the largest cable operators [through TeleWest] in the UK and has active cable acquisitions in the U.S. By contrast, Southwestern Bell has been specializing in both directories and mobile communications [and some privatizations]; Bell Atlantic and ourselves, even though we have cellular, are geared more toward privatizations and larger landline opportunities, including partnership and ownership in PTTs in Europe and Asia."

Nynex is focused principally on cable and directory business in Europe, especially the UK, Catlow adds. But the company also is leveraging core strengths in wireless and wireline partnerships in Asia, according to Nynex spokesperson Betsy Ricci.

"Our TelecomAsia partnership in Thailand is the highest-profile project," Ricci says. But the company also is a partner in a \$1.5 billion long distance fiber optic project, FLAG, extending an undersea link from the UK to Japan, with two overland crossings and 12 Asian access points, including Shanghai.

"One of our key strengths internationally is that we built one of the world's most sophisticated networks in Manhattan; that's a big selling point overseas," she says.

By contrast, BellSouth is concentrated on cellular, partial privatization and wireless data networks; territory ranges from Europe to Israel. The trend toward specialization is universal, argues Ameritech's Catlow.

"Although I can't speak for the other companies, our strategy is to take something we do extremely well and apply it to higher-growth geographies," he says. For example: Ameritech now owns 15% of the Hungarian phone company Matav (Deutsche Telekom and the Hungarian government own 15% and 70% stakes respectively). Matav's privatization resulted in 18% annual growth and the addition of 270,000 lines last year. (By contrast, Ameritech's domestic growth was only 3%.) In the same vein, BellSouth International's strong presence in European cellular has helped the company export its technology to Australia, New Zealand and India. In Germany, the company has launched what soon will be Europe's largest GSM network. BellSouth also is building and operating mobile data networks in the Netherlands, the UK, France, Belgium and Singapore.

No one wonders anymore why the RBOCs are looking abroad: opportunity in the U.S. just can't compare. Escalating deregulation in Europe and Asia has fueled international partnerships and opportunities in local and long distance services (the latter still is verboten to RBOCs here), as well as value-added data networks and enhanced secondary and alternative networks (including cellular and personal communications networks).

In the mid- to late 1980s, European deregulation began in earnest as the European Community (EC) moved to reshape the power of entrenched postal, telephone and telegraph services (PTTs); a classic example was the conservative Deutsche Bundespost, which maintained tight and costly internal control over German telecommunications. In 1987, EC officials rammed through a series of directives known as the Green Paper, designed to reform if not totally revamp European telecommunications by 1992—target date for still-elusive unification.

### **ROAD TO PRIVATIZATION**

The EC requested changes including rapid opening of the terminal equipment market to competition and progressive opening of the telecom services market, particularly value-added data services. Everything short of voice and telex was liberalized. Since then, however, other regulatory walls have tumbled down. Now, the European Union is forcing the PTTs to allow full and open competition for the gamut of telecom services—including voice—by 1998.

"In Europe, the PTTs are looking at partners to help them get ready to compete; it's changed the landscape in Europe and allowed secondary telecom operators to position themselves," says Ameritech's Catlow. "A liberalized climate allows people to build more generalized operations off of their cellular companies, helping the PTTs to become more flexible." It's sink or swim, Catlow adds: "The PTTs have to do this now or they won't survive."

Deregulation has been slower to take hold in Asia-Pacific, though international companies now hope Japan, Australia, Hong Kong, South Korea, Taiwan, Singapore and, most of all, China will open their doors even wider to competition. Thus far, lack of network infrastructures, difficult regulatory climates and poor capitalization have driven these countries to seek outside partnerships and foreign help, observes Bruce Amundson, U S West's director-financial and international operations.

"Obviously telecommunications laws in the U.S. preclude us from doing much of

## **BELLS ABROAD**

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what we can do abroad, such as cable and telephony," he says. Developing countries with fast growth, such as Indonesia, "are coming to us either because they lack the professional expertise to build networks or they lack infrastructure. They're partnering because they're trying to compete in the worldwide economy."

### CHINA

RBOC officials agree the biggest plum of all—largely untouched—is China. The country maintains tight political and economic control over its archaic telecommunications networks. At the same time, new prosperity and a boom economy meant the addition of 19 million switched lines this past year and the promise of 19 million more—plus a secondary telecommunications network, new interactive services and many other advanced features.

Companies such as Ameritech and BellSouth International already have signed memoranda of understanding with China, and business talks are proceeding, according to RBOC officials. For example, "BellSouth International is pursuing cellular opportunities, local access, long distance, some microwave networks along with a lot of exhaustive political, financial and economic analysis of China," says Marty G. Dickens, executive vice president for BellSouth International.

"All sorts of things can happen because it's a giant country and telephony development is low," he adds.

The RBOCs recognize China is a "hard sell," and it may take longer than most countries to develop profitable agreements. "Even though we're looking for opportunities in local access [including wireless] and long distance, we recognize that China is a fourth region [after Europe, Latin America and Australia] for us," Dickens says. "Many [cellular and mobile data] licensing opportunities in Europe, Latin America and Asia are coming to an end," he says. China may be the next golden opportunity—but only with the right approach.

"In China, everyone has an abiding interest," Ameritech's Catlow says. "Irres-

pective of the country's ability to pay, the growth there is beyond the wildest imagination, and it will be the next geographical focal point."

However, Catlow acknowledges that "if you want to cooperate with the two main providers of service in China, you need to be in Beijing constantly, developing relationships and trading technical notes and hosting people from China at your facilities.

"It's a very long relationship and business development effort," he says. "But it's the wish and hope of all those who want China's business that pretty soon capital will run out and foreign investment

IN EUROPE, THE PTTS
ARE LOOKING AT
PARTNERS TO HELP
THEM GET READY TO
COMPETE; IT'S CHANGED
THE LANDSCAPE AND
ALLOWED SECONDARY
TELECOM OPERATORS TO
POSITION THEMSELVES.

will be welcome at last; it doesn't seem possible for China's telecommunications to be internally funded forever."

## NO QUICK FIXES, LOTS OF SURPRISES

American telecom companies with a heavy international focus acknowledge that even the most robust global investments will constitute only 12% to 15% of total company revenues, according to Jim Jacobs, GTE's director-international development.

"We're a \$20 billion company with 50 to 60 years of historical experience in telecommunications overseas," he says. "We consider 12-15% to be a healthy return—and we're larger than any RBOCs in the U.S."

The most ambitious RBOCs aren't will-

ing to say how much they wish to derive from global investments; Bell Atlantic suggests it would be happy with better than 10%. Even with deregulation and increasing globalization, though, the era of wild expectations and sporadic investing appears over. "The real growth opportunities internationally will be in Asia, especially China, and in Latin America and Eastern Europe once it gets control of its political instabilities," predicts First Boston's Governali. "The RBOCs are looking for fast growth, less regulation and innovative things to learn that they can take home." Investments will be judicious.

Even though RBOCs uniformly deny European or Asia markets serve as test beds to evaluate products and services, many acknowledge unexpected benefits have come from synergies abroad. One example: network infrastructure software developed for BCTel by GTE, which has a controlling interest in the British Columbia phone company, now is used in GTE U.S. networks. Further, BellSouth International has found an unexpected advantage in its investment in Germany's E-Plus, the country's second private cellular company. Explains BellSouth's Dickens: "The cellular technology from Germany is DCS 1800 spectrum level, and that happens to be the same technology that is being used in PCS licenses that have just been optioned in the U.S. It happens to be the technology that BellSouth will deploy in PCS service areas; so our people that work in the business here certainly are gathering information and gaining knowledge from experience of deploying that network in Germany."

Whatever the unexpected benefits, Ameritech's Catlow acknowledges there are no pots of gold at the end of the rainbow. "People aren't rushing out and just buying anything for the sake of being international," he says. "There are no quick fixes, no magic deals.

"Deals have to stand on their own," he concludes. "When all the flurry and frenzy dies down, people have to look at how to evaluate an investment; there is going to be more discipline in picking and choosing."

Arielle Emmett is a Philadelphia-based freelance writer.



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## DEPLOYMENTS

## **PUTTING IT ALL ON THE LINE**

It only took nine days for Sprint to prove it chose the right technology.

Vince Vittore
Associate Editor

ost carriers don't like to trumpet the fact they've had a fiber cut. So when a road construction crew in Southern California cut a fiber running between Anaheim and San Diego, what did the carrier do?

It issued a press release and called as many members of the media as it could find.

Instead of admitting something had gone wrong and promising to fix the situation as soon as possible, the company—Sprint—trumpeted the cut as the first real-world demonstration that its Sonet network is for real.

It's not often that a company makes an

announcement that nothing happened, but that's exactly what Sprint did.

"It was a very good place to have a fiber cut," says Doug McKinley, directornetwork engineering.

The cut, which occurred at about 1:30 p.m. during prime time for traffic flow, came just nine days after Sprint unveiled its newly-completed, four-fiber bidirectional line switched (BLSR) ring. For Sprint customers, the switch to the reserve pair took about 50 milliseconds, a lapse barely noticeable even to high-speed data customers.

The coast-to-coast network, which includes 15 rings, actually is just the first phase of a Sonet strategy that will include moving all of the company's long distance traffic over to an expanded ring network

by 1998. By then, the network will have 43 rings connecting major cities throughout the country.

Until then, traffic will be rolled over slowly onto existing rings, including a 5100-mile ring that is the largest of its kind in Sprint's network.

## **PATENT PENDING**

Sprint is using a four-fiber BLSR architecture throughout the network for several reasons, says McKinley. "Four-fiber just gives you much more flexibility than two-fiber." Four-fiber rings let carriers perform ring or span switches in case of a fiber cut, he adds.

"One of the benefits of four-fiber is addressing the type of failure more specifically," says Rick Moran, director-product



## RBOC RINGS

## **U S WEST CHIMES IN WITH ITS OWN SONET**

hough Sprint now can claim the industry's longest Sonet loop, the IXC certainly isn't the only carrier using the technology. U S West, one of the first to deploy "self-healing" technology, will rely heavily on Sonet for the buildout of its \$53 million U S West Network 21.

The specific network architecture has not been decided yet, says Gerry Altermatt, group product manager-strategies and issues planning at U S West.

An RFP for the network was put out several months ago, with five vendor responses, he adds. These include both two-fiber and four-fiber bidirectional solutions

The final decision, expected soon, will be based on ability to put together the most economical network and that which best fits the RBOC's technology plans.

The network, which will be deployed over the next four years, will target key wire centers within metropolitan areas and protect about 75% of U S West's private line and switched traffic. The first to benefit will be the company's largest customers with sizable private-line networks.

The RBOC also is looking at the network as a way of improving its management capabilities.

Construction in the Phoenix area will begin this year with Minneapolis/St. Paul, Omaha, Neb., Portland and Salt Lake City deployments scheduled to begin early next year.

marketing for NEC, which is providing most of Sprint's network equipment west of the Mississippi River. (Alcatel Network Systems is the supplier for most equipment east of the river.)

Span switching routes traffic in the same direction from working lines to protection lines on any span within the ring. It is automatic in the event of a fiber cut or failure and also can be used by carriers during routine maintenance.

Two-fiber rings, he adds, work under the assumption that the carrier has physical diversity, which is not always possible. In Sprint's case, McKinley says, initial construction routes were dictated by existing fiber. "The rings tend to go there because that's where the fiber goes. You're stuck with building them on your existing network to some extent in the early phases."

In the next phase of construction, the 5100-mile ring will be cut into several pieces as it passes through several California cities, Phoenix, El Paso and Ft. Worth, Texas, Okarche, Okla., Kansas City, Omaha, Neb., Cheyenne, Wyo. and Reno Junction, Nev.

"We're moving forward as fast as money and physical limits will allow us," says McKinley. Sprint has accepted the four-fiber BLSR rings to the point that it applied for a patent based on the architecture for interLATA traffic. "We've proven beyond a shadow of a doubt that we could make it work," McKinley says.

## THE NEED FOR SPEED

Just as important: the capacity of fourfiber ring architectures.

All links on Sprint's backbone are running at OC-48 level. That typically would provide 48 DS3 links between cities, says McKinley, though there are several variations on that basic pattern throughout the network.

"We're going direct to OC-48, so it's not a waiting game to see if the technology pans out," he says.

Eventually, many of those links will be upgraded to OC-192, though it's uncertain exactly when and how.

Moran says vendors currently are proposing two methods to bulk up networks to OC-192. The first would use wave division multiplexing and pull to four OC-48s. That method, which Sprint says it probably will use first, will be available this year. OC-192 via time division multiplexing will be available early next year.

Selecting a method will depend greatly on carriers' capacity needs, he adds. If the requirement within a link could be handled by five OC-48s, WDM would more effective. Others may wish to wait for the TDM solution. Regardless of which method is used, Moran expects to see some volume deployment soon. "There's a lot more realistic testing going on now where the carriers are coming out of the lab."

For Sprint's purposes, McKinley says the company is just starting to see its first orders for OC-3 access from end users, leading him to believe it may be some time before it needs OC-192 in many areas. That gives the carrier more time to experiment. "I think we'll see OC-192 when some customer steps up and says they want it. We'll look at the [WDM] technology first, though."

On the network's access side, Sprint will lease capacity on local telcos' OC-48 pipes to provide OC-3 access to some end users. That portion likely will increase soon, says Bob Runke, vice president-access management for Sprint. "You have the bleeding edge customer who needs it today. Do we see it in the future? Absolutely. We see the bandwidth requirements just exploding."

### TRIPLE PLAY ALLIANCE

The company may get its biggest burst in traffic from the Triple Play alliance. Originally brought together to bid on broadband PCS spectrum, the alliance, including TCI, Comcast and Teleport Communications Group, will provide local access to many customers via the 2GHz spectrum.

"We still have a backbone network that is what we like to call bulletproof, and Triple Play is a supplier to our backbone network," says Runke.

In many cases, the alliance will use similar technology to run rings around key metro areas and support its PCS infrastructure, he adds. "We find that makes our backbone that much more compatible."

Initially, most PCS calls will be local, but as users start using more long distance, the alliance will benefit from compatibility with Sprint's long distance rings, Runke says. "They will be separate distinct networks that are connected by similar technology."

## BROADCASTERS, CARRIERS MUST DEVELOP STRATEGY TOGETHER

Heavier reliance on Sonet demands cooperation to ensure transmission of top-quality video and audio signals.

## **Dennis Kucera and Eric Foasberg**

ommercial broadcasters, particularly those with global strategies, are beginning to rely more heavily on terrestrial Sonet networks that have the channel capacity and bandwidth necessary to support real-time and high-density data feeds. This gives the networks the inherent capability to move to geographically remote operating units almost immediately.

At a technical level, broadcasters find Sonet networks attractive because of their physical and logical attributes. Fiber networks do not suffer from the effects of signal transmission latency, nor the atmospheric effects typically associated with satellite and microwave transmissions—two conditions that dramatically impair video and audio signal quality in the time and frequency domains.

Fiber networks also are relatively predictable performers thanks to their selfhealing architecture and designed-in system redundancies. Best of all, Sonet is an open architecture, allowing broadcasters to gather information and file reports in real time, from almost anywhere fiber is deployed.

Since a broadcaster's products are sensory, signal quality is a paramount concern—this explains their increasing reliance on digital production equipment. A broadcaster's first-generation signal is referred to as "contribution quality." This is defined as a digital signal with 10-bit video and 18-bit audio resolution as compared to a "broadcast quality" signal with 8-bit video and 16-bit audio resolution.

Once the signal is acquired, it must go through several transformations prior to fiber network transmission. Tests on the signal are performed at several stages of this process to ensure signal integrity is not lost.

Certain tests are broadcast specific, while others are Sonet specific. Understanding the testing stages can help network operators and broadcasters work together more efficiently, solving minor problems as they occur.

### **TESTING STRATEGIES**

Signal tests are made in the analog, digital and optical domains, typically at five points in the transmission path (see figure). Some tests the broadcaster makes also can be performed by network technicians accessing the craft port of network elements (NEs). Since broadcasters using the right equipment can get a glimpse of network-side activity, they can identify certain problems and call network operators to share their findings.

At the first stage of testing, the original analog video/audio signal acquired by a camera, for example, is monitored for overall quality and for any impairments. A video test set, often used for this purpose, verifies the signal's proper analog characteristics in the frequency, time and amplitude domains. Checks are made for signal gain, noise, sync rates, modulation levels, luminance, chromanance and phase jitter, among others. If anomalies are present, the video test set will identify them (test point A).

With the integrity of the analog signal verified, the signal stream is encoded into contribution-quality digital data. This is accomplished with a Sonet video/audio transport—a device that generates a data stream meeting requirements of the shorthaul EIA/TIA 250-C transmission standard.

In a second signal processing stage, the transport maps the digital data stream to the Sonet physical layer. As this occurs, bit-interleaved parity (BIP) bytes B1, B2 and B3 are added to the transport overhead (TOH) structure for transmission verification.

Additionally, J1 byte path trace messages are embedded in the payload envelope to identify the originating equipcontinued on page 58

Analog Video/Audio Signal Source (Color Bor Burst)

Network Rement(s)

(Test Paint A)

Videa (Test Point B)

Test Set

Videa (Test Point B)

Videa (Test Point B)

Videa (Test Point B)

Videa (Test Point B)

Videa (Test Point C)

Sanet Test Set

Upstream

Video /Audio Signal Destination (Color Bar Burst)



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continued from page 56

ment—in this case, the video/audio transport. The H1 and H2 pointer bytes used during transmission for frame alignment and for frequency adjustment of payload data also are added.

Now properly mapped, the synchronous transport signal is injected into the network through an available network element at a Sonet OC-3c (3 concatenated payload frame) transport rate. Note that an OC-3c structure is used to ensure adequate transmission bandwidth for the high-density data stream (OC-3c transmits data at about 156 Mbps).

Because the video signal now resides within a synchronous transport signal, it is tested for bit error rates, packet framing, transmitter/receiver reliability and pointer movements. Addressing these requirements takes a video/audio transport's built-in testing capabilities or a Sonet test set, which combines a high-bandwidth bit error rate tester with functions to scan and analyze Sonet overhead structures and payload mapping/demapping automatically.

To confidence test the overhead and

payload exclusive of the network, the video/audio transport is connected in a loopback configuration, where output is routed directly back to its input (test point B). The internal test subsystem makes specific checks on critical signal parameters and downloads the test results to a PC for display, analysis and storage. Tests include the validity of the B1, B2 and B3 parity bytes, checks for far-end block errors (FEBE), accuracy of the J1 Path Trace messages and indications of any jitter found on the H-pointers.

In an expanded form, broadcasters perform loopback testing over the network with the test set. This approach assumes that physical network connectivity already exists from source to destination and that two OC-3c channels are available. For this test, the entire synchronous transport is transmitted. For example, on the downstream OC-3c, a test set analyzes the signal's frame overhead and payload. On the upstream, it receives the signal's FEBE responses. If FEBE errors are displayed, the offending network element is identified and network operators can be called in to assist (test point B).

Using a test set in a source-destination testing approach, broadcasters perform path connectivity tests to verify whether the payload is being sent correctly through the network (test points B and D). Transmission quality checks, in the form of bit error rate tests and looking for FEBE errors, are performed to measure the transmission channel's reliability factor as a percentage of transmit/receive errors for the defined data transfer rate (OC-3c to OC-48).

### **SOURCE-DESTINATION TESTING**

Fault tolerance tests, which assess the network's ability to deliver payload under less than ideal network conditions, also are performed in the source-destination testing approach. These include generating signal packets and sending them over the network to test response to alarms, exercise automatic protection switching circuits, analyze the H-pointers for movement limits and jitter, plus analyze line/tributary frequency offsets. Reviewing the results gained from this battery of tests, specific network-side problems can be identified by the broadcaster and passed on to network operators for pursuit.

A network technician with a test set can perform the same Sonet tests described above by connecting to NEs in the transmission path (test point C). At the destination, the broadcaster can do the same. When the signal is demapped from Sonet by another video/audio transport, it is decoded back to a 10-bit video and 18-bit audio data stream. Here, the video test set again comes into play. Since the data stream still is digital, the broadcaster uses the video test set's bit error rate testing functions to make a final determination of signal quality. Once the tests are completed and the signal deemed satisfactory, it is usable in digital production systems or digital-to-analog conversion for analog production work.

The advantages of transmitting high-density and real-time data over Sonet networks are numerous—especially for broadcasters with a global venue. The goal of short-haul signal quality over extreme distance with no degradation in signal quality is achievable. Network operators should start by understanding their customer's test requirements and incorporate them into their own testing strategies.

Dennis Kucera and Eric Foasberg are with Tektronix, Inc.



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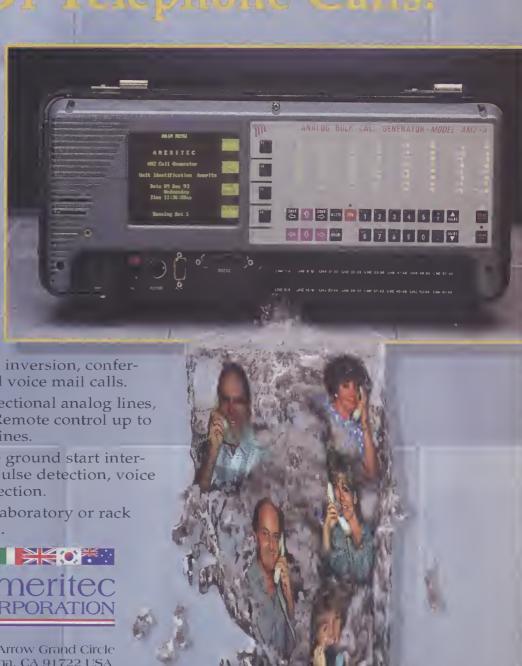


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## POSITRON SHRINKS MUXES, PROVIDES ALTERNATIVE TO DLC

**Vince Vittore Associate Editor** 

s carriers begin extending their Sonet networks, many run into a space problem trying to drop T1 lines into single buildings.

The traditional solution has been to pull fiber into a pedestal or pole-mounted digital loop carrier (DLC) cabinet or deploy a proprietary point-to-point solution.

Placing an OC-3 multiplexer in such an environment was impossible because of space limitations. This solution carried the added disadvantage of few management capabilities.

Positron Fiber Systems (PFS) may have devised a solution in its Osiris-Micro, an OC-3 add/drop multiplexer one-fourth the size of traditional muxes.

The company accomplished the size reduction by eliminating much equipment typically placed at the customer's location. In many deployments, carriers would deploy DLCs around a ring and put cabinets at the premises, says Andrew Knott, vice president-sales and marketing for PFS. "Nothing else will fit in those small cabinets." Additionally, carriers using the DLC solution needed a box in the central office for each node.

Under PFS's proposed solution, a carrier could deploy multiple muxes around a ring and have a single TL-compliant box in the CO for management. Each mux can deliver as many as seven DS1 or Ethernet LAN interfaces per site.

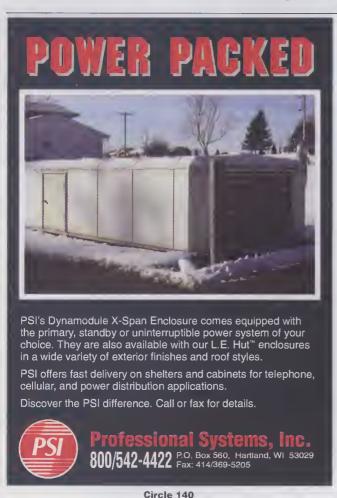
Such a solution could be particularly well suited to competitive providers, says Knott. "For competitive access providers, the big issue is how much does it cost to light a building? Anything that reduces their cost of getting into the building is beneficial."

For a mid-size competitor, that cost typically runs about \$25,000, with a big part of that being the muxes, he adds. There's also the addition of a power supply, cage and

The PFS solution eliminates the rack and power supply at the customer location. "In this case, you just screw a box on a wall. You don't need a rack, and it's UL-certified for building installations."

In cases of building power failure, each unit has an optional integrated ac distribution and battery backup, which will keep everything running as long as eight hours.

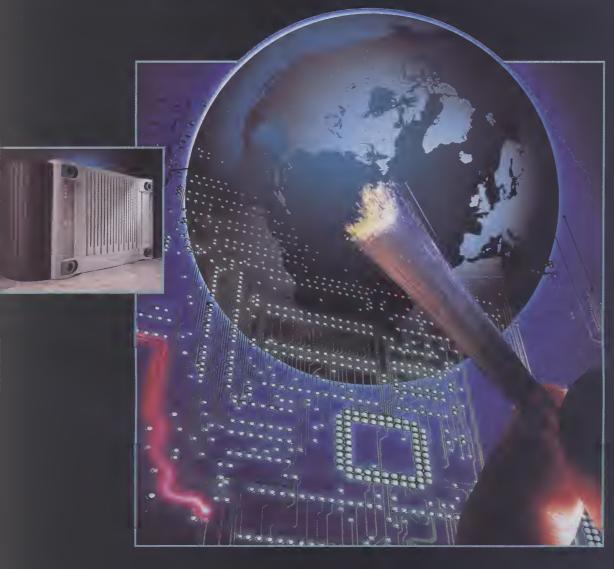
For big carriers, the PFS solution will save about 40% over DLC solutions, he adds.





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## **WIRELESS SONET**

## **SONET TAKES TO THE AIR**

**Vince Vittore Associate Editor** 

onet technology has proven itself in the fiber world, allowing carriers to provide service despite fiber cuts. But what about service areas where stringing fiber is too expensive or simply impossible?

The answer lies in a relatively older technology-microwave. "Microwave is still an economical way to get capacity between sites," says Mike Barbera, product line manager-high capacity radios for Alcatel Network Systems, which has developed a line of three hicap synchronous radios. The line includes two that transmit at 6GHz and one at 11GHz, providing true Sonet transport and accommodating as many as three

Each system can be linked directly to an add/drop mux, giving carriers the ability to extract T1s wherever they're needed.

In a Sonet ring configuration, the radios will maintain frame structure. Additionally, timing capabilities can be maintained internally or independently. If the radio is communicating between two offices, the carrier has independent timing mechanisms, says Barbera. Initially, the radios will have BITS clock capabilities. However, that eventually will be upgraded to a Stratum 3 capability, he adds. "We recover timing off radio the same way you do in the fiber world."

Though not announcing any contracts yet, Alcatel expects its first order to come from carriers in mountainous regions. Canadian operators already have expressed strong interest.

In some cases, private network operators also may have reason to add a radio element to their network, Barbera concludes. "Those guys may see some synergy if they can have the radio completely compatible with the fiber."

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MONITOR - Peter Luff of TTC, which is helping lead the new group's efforts.

information base), directing virtual circuits to testing and monitoring equipment for analysis.

ATM's fast-paced development leaves private network managers two options: join the process or get left behind. "Most of the [ATM] work has been on the telephone [network] side so far," explains Peter Luff, marketing manager-internetwork test business unit for TTC.

Unless private network managers plug into ATM's development process, specifi-point connections

21 | 170 Other Carrier
22 | 120 TELEGOMMUNICATIONS COMSULTANT
23 | 33 CONSTRUCTION CONTRACTOR
24 | 40 CONSULTING ENGINEERING FIRM
25 | 50 MANUFACTURER OR DISTRIBUTOR
OF TELECOMMUNICATIONS COUPMENT
26 | 400 OTHER

## LEFT IN THE DARK

Without access methods, point-to-point virtual circuit (VC) connections eliminate a network manager's ability to monitor physical through application layers. "It's similar to when a PC connects to a hub—it only sees the hub and not the other PCs," he explains. Unless ATM testing and monitoring capability is built in, private network managers are left in the dark.

2 Outside Plant 3 Engineering/F

"The idea is to grab a virtual channel by sending an SNMP command to the switch," he explains. "You tell the switch to divert traffic to the test port, which can be either a dedicated or unused port on the switch. The MIB defines the way you talk

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P-Com Inc. received a \$4.8 million order for 38GHz digital millimeter wave radio systems from Advanced Radio Technologies (ART). The purchase represents an initial order against a two-year contract.

ART provides wireless broadband network services for voice, video and data in more than 50 U.S. markets, with FCC applications pending in another 80 markets.

Campbell, Cal.-based P-Com provides radio links to cellular and PCS systems as well as private networks.

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## ATM MONITORING

## STEERING COMMITTEE

A new group will develop specs to direct ATM traffic to test ports for monitoring.

Mark Dziatkiewicz Technology Editor

eading ATM switch, remote monitoring and test equipment manufacturers are forming the ATM Monitoring (AMON) group, a move that should benefit private network managers and service providers.

The consortium proposes developing open standard specifications for an ATM circuit steering (ACS) MIB (management



MONITOR - Peter Luff of TTC, which is helping lead the new group's efforts.

information base), directing virtual circuits to testing and monitoring equipment for analysis.

ATM's fast-paced development leaves private network managers two options: join the process or get left behind. "Most of the [ATM] work has been on the telephone [network] side so far," explains Peter Luff, marketing manager-internetwork test business unit for TTC.

Unless private network managers plug into ATM's development process, specifi-

cations could close them out of future network management capabilities. "We'd be stuck and network managers would have very little way of gaining access to ATM traffic," Luff says.

As a public network service, ATM logically usurps considerable network management and control from private networks. Previous ATM MIBs provided monitoring capability for lower levels such as the physical and ATM layers. But network managers need to monitor upper levels (layers 3 and above) to resolve protocol problems and analyze network traffic. AMON's work will "keep the door open," providing opportunities to retain much of the existing network management capabilities.

"It's a big issue a lot of network managers haven't considered yet," Luff continues. "With legacy local area networks, you have a lot of network analyzers available—on Ethernet, Token Ring, FDDI. On the wide area, the same thing—network managers get a view of all the traffic on the network. But that won't be the case with ATM, because it's a series of point-to-point connections."

### LEFT IN THE DARK

Without access methods, point-to-point virtual circuit (VC) connections eliminate a network manager's ability to monitor physical through application layers. "It's similar to when a PC connects to a hub—it only sees the hub and not the other PCs," he explains. Unless ATM testing and monitoring capability is built in, private network managers are left in the dark.

"The idea is to grab a virtual channel by sending an SNMP command to the switch," he explains. "You tell the switch to divert traffic to the test port, which can be either a dedicated or unused port on the switch. The MIB defines the way you talk

continued on page 64

## CONTRACT LOG

ADC Telecommunications and Bellcore have joined forces to develop an element manager system for managing ADC's Homeworx hybrid fiber/coax (HFC) access network. The BroadNet-based OSWorx CMISE element manager will manage Homeworx video, data, telephony and power elements.

Based on the ITU's Telecommunications Management Network structure, the element manager will enable flow-through provisioning that will allow immediate service turn-ups and alarm correlation allowing providers to diagnose and repair faults quickly. The system's first release is scheduled for early 1996.

Antec Corp. will provide materials management services for Pacific Telesis Video Services for the RBOC's new HFC network. The five-year, \$26 million contract calls for Antec to staff and manage four regional warehouses and deliver subscriber coax drop material for inside wiring as needed.

Products to be provided include coax drop cable, connectors and splitters. Antec also will provide inventory management, streamlined billing and product purchasing systems.

Pac Tel's HFC network will reach about 5 million homes, starting in San Jose, Orange County, Los Angeles and San Diego, by the year 2000.

P-Com Inc. received a \$4.8 million order for 38GHz digital millimeter wave radio systems from Advanced Radio Technologies (ART). The purchase represents an initial order against a two-year contract.

ART provides wireless broadband network services for voice, video and data in more than 50 U.S. markets, with FCC applications pending in another 80 markets.

Campbell, Cal.-based P-Com provides radio links to cellular and PCS systems as well as private networks.

continued from page 63

to the switch to grab the virtual circuit of interest."

ATM is connection oriented and enables users to send data to other users via VCs. Without a standard monitoring method, network managers cannot resolve protocol problems.

But ATM does provide a mechanism to copy VC traffic and send it to specific ATM network locations. The ACS MIB will take advantage of this multicast capability, directing traffic to designated test equipment for analysis. The proposed specification will be submitted to the ATM Forum for approval.

Establishing an ACS MIB provides several key ATM market benefits: VC monitoring lets users monitor VCs non-disruptively to debug protocol problems, resolve application problems and collect information to model the network.

It also provides an upgrade path for existing monitoring equipment, protecting investment and precluding training needs for new equipment. VC monitoring defines a standard method for steering vir-

tual circuits, enabling test equipment to work with any other conforming ATM switch; and it accelerates time to market and functionality of ATM devices and monitoring equipment.

"It promotes the deployment of ATM because it helps network managers dispel some of the mystery surrounding ATM," Luff adds.

## IT PROMOTES THE DEPLOYMENT OF ATM BECAUSE IT HELPS NETWORK MANAGERS DISPEL SOME OF THE MYSTERY.

The ACS MIB keeps private network managers in the loop but fills a void for public network operators as well. "The principal beneficiary is the private network manager," admits Luff. "But it provides network operators an ability to get in and look at traffic for troubleshooting as well." The capability lets public network opera-

tors provide the gamut of ATM network service management options to their private network customers.

The AMON founding group comprises 15 ATM switch, remote monitoring and test equipment manufacturers. Participants include ADC Kentrox, Armon Networking, AXON Networks, Cabletron Systems, Cascade Communications, Fore Systems, Frontier Software, Hewlett-Packard, Net2net, Network General, Nortel, Strata-Com, Technically Elite Concepts, TTC and Wandel & Goltermann Technologies.

Participants were drawn together by a common objective. "The networking industry is like a big club," Luff says. "A group of people were asked if they were interested in participating. The expressed desire of the founding group was to be small—not to be exclusive but to move quickly. Fore Systems is the catalyst for all this and deserves the credit for putting it together."

It's another step toward ensuring ATM's schedule meets all parties' needs. "There will need to be more activity like this to move things further, but it's a good start," Luff says.

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## **BOOSTING BANDWIDTH, MARKETS**

AT&T Paradyne makes good on delivering 6  $\bar{M}$ bps ADSL and looks to data applications as a promising new outlet.

Eric Krapf Managing Editor

s a video delivery technology, early ADSL never quite sat right. At 1.5 Mbps, it lacked the bandwidth to offer video on demand in a form the market was expected to demand.

Two things have changed. First, the long-awaited 6 Mbps ADSL has arrived, promising better video to multiple TV

sets, thereby addressing two of ADSL's critical weaknesses. At the same time, the technology's proponents increasingly are promoting ADSL as a way to provide Internet access and other bandwidth-hungry data applications for which demand has been exploding.

The 6 Mbps solution comes from AT&T Paradyne, which introduced a fully-integrated core transceiver that supports both ADSL and HDSL. AT&T Paradyne achieved more than 50% reduction in the size, power and cost for the transceiver's VSLI, according to Frank Wiener, business development director-advanced transmission technologies.

A strategic alliance of Motorola and Amati Communications earlier this year announced it would produce a 6 Mbps single-chip ADSL, but that product won't be available until the second half of 1996.

The AT&T Paradyne product makes asymmetrical digital subscriber line a little less asymmetrical. The product, called GlobeSpan, increases the reverse channel from 16 kbps to 64 kbps, with plans for a 640 kbps reverse channel by early next year, according to Wiener, who says the more capacious reverse channel was a direct response to telco demand.

"They felt if we could give them 64 kilobits, they could roll that out as a data service," Wiener says.

The increased reverse bandwidth will enable quicker downloading of Internet files, as well as remote LAN access for work-from-home applications, Wiener says.

The most important thing about 6 Mbps ADSL may be its potential to jump-start flagging interest in a technology that threatened to be overshadowed, according to analyst Beth Gage, broadband consultant for TeleChoice.

"The real significance of [6 Mbps ADSL] is that it really helps spark the interest of the telcos," says Gage.



ADSL SOLUTIONS - Products such os these from Westell may help make the most of copper lines.

She maintains that "you certainly don't need six megabits for data applications." Lower-speed T1 ADSL can compete with ISDN and frame relay for work-at-home applications, but higher bandwidth makes ADSL the video player it originally was touted as being.

The strategy could be to use lowerspeed ADSL data customers to pay for higher-speed video implementations, according to Gage.

"That certainly lends itself to having the potential to be around awhile," she says.

### STATE OF THE MARKET

Still, positioning ADSL as a data solution says as much about the state of the industry as it does about the technology, according to Rob Faw, president and CEO of Westell International, one of more than a dozen Paradyne licensees.

Faw points out that cable TV competition has been driving the industry for the past couple of years, so carriers naturally were interested in what ADSL could contribute to their video efforts.

Now that the Internet and other data applications are hot, interest is shifting accordingly.

"I think it's kind of an environmental statement," Faw says.

But any buzz that develops about data uses, particularly for work-at-home applications, raises the specter of ADSL vying against newly-resurgent ISDN.

Gage notes ADSL's most obvious advantage: its higher bandwidth. And she observes that while ISDN deployment is rising, it's still not ubiquitous, leaving ADSL an opening. But the fact that telcos have started to roll out ISDN on a larger scale may be the best argument for believing they'll continue.

"You have to balance the fact that they have started to deploy it," Gage says. "Are they going to turn their back on ISDN?"

Also, Gage points to momentum in the ISDN equipment market, while "the ADSL equipment market is still a big question mark.

"Personally, I do not see that the two compete in the same areas," Gage concludes. "What I think we will see in the long run is a co-existence of the technologies."

Faw agrees, comparing the situation to the emergence of the VCR, when some predicted the death of cinemas. He, too, expects that both technologies will survive in the market.

Future GlobeSpan upgrades are expected to support ATM and frame relay, according to Wiener. And the issue may not be data *or* video—Wiener calls the two "complementary."

"The market itself is still determining the applications it will deliver," he says.





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#### **NEW SYSTEM CLAIMS** FULL MOTION, NO BLUR

**Eric Krapf Managing Editor** 

t could be refreshing news for those who want high-end video conferencing: a desktop system that can provide video at 30 frames a second and uses

"exhaustive pixel refresh" to eliminate blurring when participants move.

The manufacturer, a twoyear-old company called Imagelink Inc., has some 3000 installs worldwide and now is breaking into the U.S. market. The product, Virtual Desk PC, has customers including Time Warner, American Express and the military. Company president Paul Cummings says Imagelink is targeting Fortune 500 users.

"Rather than look for something that was real cheap, we looked for something that was high end," Cummings says.

The system's codec provides one key to its high quality. It was created four years ago by Bitfield Oy, a development company in Espoo, Finland. Imagelink started out reselling the product internationally, then took on the manufacturing and sustaining engineering, Cummings explains.

The system was more successful overseas "quite frankly because of ISDN deployment in Europe being more widespread," Cummings says.

#### **30 FRAMES A SECOND**

The codec allows video at as much as 30 frames a second, Cummings claims. That figure has been a lodestar for video conference systems, though Cummings says beyond 20 frames a second, the eye really can't tell the difference. Going up to 30 may be as much a status factor for the buyer, he admits.

a second," Cummings says.

But full-motion video still can be disconcerting; if motion no longer is jerky but still blurs when figures move on the screen, the picture can be distracting. "It's not just getting the video, it's getting the

"They all want to say, 'Up to 30 frames

LOOK NATURAL - Imagelink's newly-introduced system promises more real-life video along with whiteboarding applications to fit the

video in a clear, precise fashion," Cummings insists. But he says Imagelink has solved that problem as well.

Virtual Desk PC uses "exhaustive pixel refresh," which constantly monitors the video and only sends out a new pixel when a portion of the picture actually has moved, Cummings explains. Other systems use "random pixel refresh," which can create blurring. The Imagelink system "makes it more real-life," Cummings claims.

The system is Windows based and can operate on a 386 CPU or higher. "You're

being done: high-end graphics for engineering or more business-oriented whiteboards. The company also creates customized whiteboard applications.

not limited by the processing power of the computer because it's a standalone prod-

Virtual Desk PC complies with all video conference standards including

It also adheres to all current networking

And though the video-related advances

Rather than offering one standardized

may be the most impressive, Virtual Desk

PC also offers top-of-the-line whiteboard

package, Imagelink has several off-the-

shelf varieties based on the kind of work

H.320 and the still-unfinished T.120 stan-

uct," Cummings says.

dard for whiteboarding.

standards.

capabilities.

"Everybody doesn't want to do the same kind of collaborative computing," Cummings notes.

And though Imagelink markets Virtual Desk PC as a high-end product, it's definitely "low end of high end" when it comes to price, Cummings says.

The system, including camera, speakers, microphone and headset, sells for \$4699.

#### HELPING ISDN GET TO THE DESKTOP

Eric Krapf Managing Editor

ollaborative computing with video conferencing is a great idea, but the cost of running individual ISDN lines to everyone who needs them can limit deployment.

First Virtual Corp. (FVC) is tackling this problem with an ATM/ISDN gateway, developed in conjunction with AT&T Global Information Solutions, that allows high-speed local area network users to share ISDN lines.

FVC spokesperson Dianne Guthman notes that for a recent trade show in New York it cost \$200 to pull a single ISDN line to FVC's booth. You'd have to triple that to get enough capacity for a single high-quality 384 desktop video conference.

Multiply that by however many people

a user wants to include in a system, and costs add up quickly.

It's also a physical problem "just pulling cable itself to the desktop," notes FVC marketing director Doug Tsui. Besides the LAN cable, each desktop needs two pairs for BRI cabling, three extra pairs for the 384 video conference application and a data cable.

"That just doesn't get done," Tsui says. Routing ISDN through a PBX avoids this problem but incurs costs to upgrade the PBX. So FVC's solution transforms a PC into an ATM/ISDN gateway.

The hardware and software package, called the Media Gateway Server (MGS), comes with a PRI or BRI card, according to Tsui. A large system also can use multiple gateways.

Kanematsu Corp. will beta test the system, using it for desktop video conferencing among its offices in Sunnyvale, Cal.,

and two Tokyo locations. A Southern California hospital also is beta testing the product, Tsui says.

The MGS upgrade kit with four BRIs will sell for \$5700.

MULTIPLE ISDN LINES TO EACH USER CAN CREATE A PROBLEM "JUST PULLING CABLE TO THE DESKTOP."

In conjunction with the gateway, FVC also introduced an H.320/ATM adapter. Also residing on a PC, the adapter has a direct connection to an H.320-based codec interface board.

The adapter works with FVC software to allow video conferencing application software to work through ATM rather than an ISDN connection.





#### **RUNNING INTERFERENCE?**

Jim Valentine says he's concerned about GSM transmissions' effect on hearing aids. Opponents say he's more concerned about its effect on companies with rival technologies.

#### Mark Dziatkiewicz Technology Editor

t's just a technology issue. Guarantee compatibility between digital wireless systems and hearing aids before technology disenfranchises millions of hearing-impaired Americans. Jim Valentine says he's working to help the U.S.'s 4 million hearing aid wearers, but others in the industry say he's got other motives.

Valentine's Hear It Now Coalition, part of the Wireless Communications Council he chairs, seeks to stop GSM and other digital wireless implementations until manufacturers solve a hearing aid interference problem. But not everyone agrees there's an issue or problem needing resolution. And Valentine's previous affiliations with groups supporting competing standards have raised questions about the effort.

The debate stems from independent studies showing an interference problem with European GSM and hearing aids. "Every country has done a test," says Valentine. "There's at least five and probably 20 independent tests that have been done, and they all show [GSM] interferes [with hearing aids]." Since DCS 1900 is a direct U.S. port of the GSM standard, Hear It Now contends the U.S. standard will create problems, too.

"The technologies are identical," he says. "They [European GSM] operate at two watts of peak power. In the United States, they'll operate at one watt of peak power. It's the peak power that causes the interference, and at two watts there's more. [In the U.S.], low power is .125 watts and one watt is peak power. Despite the fact that it is operating at less power, it still interferes."

#### THE BUZZ ON GSM

Interference manifests itself as a loud, annoying, painful buzz, according to Valentine.

"At three feet, it's just a buzz," he says. "Close up, it can be painful enough that you





can't keep it [a phone] close." He contends GSM equipment manufacturers downplay the effects and suggest trivial solutions. They say, "Don't use the telephone, change your hearing aid or use the ear that the hearing aid is not in," he continues. Mandating hearing aid shielding—another suggestion—can't be done, he claims.

GSM is the known interference culprit and seems to be Hear It Now's primary target, but other digital technologies could have problems as well.

"We don't want any technology interfering with hearing aids," Valentine explains. "We don't know whether TDMA has a problem or not."

But he does claim CDMA has no interference problem. "It's certainly not the case with all digital phones," he says. "Analog is a continuous wave and CDMA is a continuous wave. CDMA is based on spread spectrum technology—it's a characteristic of the technology. Digital technologies based on pulsing are going to have [interference]. The more power they have, the more there is. The more cycles, the more there is."

While the industry agrees—in principle—with many of Valentine's claims, some disagree with his facts and question his motives.

#### 'THERE'S AN ISSUE'

"Yes, we acknowledge there's an issue," says Mark Buford, spokesperson for equipment manufacturer Nortel. "But it's not as severe an issue that would require the government and FCC to step in and regulate its use. The interference he refers to as having been reported in Europe takes place at four times the power of the handsets in the U.S."

Anne Schelle, vice president-external affairs for American Personal Communications, concurs.

"Valentine's assertions are false in



"THERE'S AT LEAST FIVE AND PROBABLY 20 INDEPENDENT TESTS THAT HAVE BEEN DONE, AND THEY ALL SHOW [GSM] INTERFERES" WITH HEARING AIDS.

regards to intensity and the fact that there's a health and safety issue. You don't get interference from being near or walking by a phone," she says. "And GSM interference is no more than TDMA or CDMA. It's a battle as to what technologies are going to be chosen, and Valentine has chosen CDMA. What's he's asking is like requiring Honda Accords to run 15 mph in a 25 mph zone."

Nortel also takes exception to CDMA's supposed lack of interference.

"They've focused on GSM, but virtually everyone else in the industry will tell

you interference with hearing aids is a digital phone issue and not just GSM phones," explains Buford. "There's some level of interference from TDMA and CDMA. In fact, the same kind of interference is caused by fluorescent lights, PCs and airport metal detectors."

No one downplays or ignores the interference issue. In fact, work is in progress to evaluate and solve the problem. "There are viable solutions, and the industry is working with groups like CTIA and PCIA and with the hearing industry to research problems and find out specifics of how interference is caused and work to provide effective solutions," says Buford.

#### **RESEARCH EFFORTS**

CTIA has been very active in that regard. It stresses the issue is one of interaction management and not public health or safety; solutions involve power, distance and shielding or some combination of the three. The Center for the Study of Wireless Electromagnetic Compatibility at the University of Oklahoma has a research project to quantify the source of any problem and recommend solutions.

Opponents also question the motivation behind Valentine's contentions. Valentine is former president/CEO of North American Wireless, which will act as general contractor for potential PCS designated entity spectrum licensees. And it's committed network implementation to AT&T Network Systems' CDMA equipment.

Any delay in GSM-based networks could be advantageous to competing technology operators—such as those committed to CDMA. CTIA makes a stronger assessment.

"He is taking this and using it to get a market advantage," says Mike Houghton, CTIA spokesperson. "CTIA is technology neutral—let the marketplace decide. But we are interested in solutions; he's just trying to get market advantage."

Valentine contends his intentions are pure, and he says the issue must be dealt with now.

"I don't see anyone telling hearing aid wearers that they can't have access to what will become the primary communications system in the country," he says. "In three years when this problem becomes fully aware, let's hope that no one tries to shut down the industry. If I know there's going to be a problem, I'd like to address it today rather than later."

#### **DIGITAL WIRELESS AND HEARING AIDS**

#### **VALENTINE CLAIMS:**

- GSM causes interference; CDMA doesn't; and TDMA's effect is unknown.
- Problems are caused by pulsing technologies such as GSM, while continuous waves such as analog and CDMA are harmless.

#### **OPPONENTS CLAIM:**

- Some interference may occur with GSM but not enough to be a problem.
- Interference arises not only from GSM, but all digital technologies as well as common items such as fluorescent lights.

#### **GSM ELEMENTS MESH**

Mark Dziatkiewicz Technology Editor

roving GSM's readiness for North American PCS services, Nortel and Nokia successfully demonstrated interworking between PCS 1900 switching and base station radio equipment.

The companies verified interoperability between Nortel's DMS Mobile Switching Center and Nokia's PCS 1900 Base Station System using the PCS 1900 "A" interface. "It's significant because one of the big advantages or strengths of GSM is the open interface," says Nortel spokesperson Mark Buford. "Service providers can select various components of their networks from different manufacturers and still be sure the thing is going to work. It allows them to not be dependent on one vendor."

GSM is the technology of choice for a number of PCS license holders including American Personal Communications, BellSouth Personal Communications, Pacific Bell, Go Communications, Western Wireless and Omnipoint. But technology choice notwithstanding, second- or additional-source supplier announcements appear the norm as PCS networks take shape—no provider wants to get caught without adequate equipment in what likely will be a hard fought market-share battle.

#### **GUARANTEEING INTEROPERABILITY**

PCS 1900's system-level open interface specifications guarantee interoperability between network elements. Selecting multiple equipment vendors allows carriers to implement flexible network construction strategies. "Service providers are selecting multiple vendors to supply their networks. But that doesn't mean they're mixing or have to mix components," Buford continues. "They could be supplying a complete

system for area 'A' or area 'X.' We announced a contract with Go Communications for switches and base stations, and [Go Communications] recently announced a contract with Nokia for base stations. No service provider other than Go Communications has said they will mix components, but a lot of them are looking at it."

CDMA and TDMA supporters will do without equipment flexibility since interfaces are non-standard or proprietary. While some vendors support open interfaces, a groundswell is lacking and service providers must plan network implementation strategies accordingly. "CDMA and TDMA interfaces between base stations and switches are not open interfaces or standards," adds Buford. "But the GSM specification provides an open interface, and anyone who meets that standard should be able to interoperate."

Buford adds Nortel is the "first and only" manufacturer receiving FCC certification for GSM equipment—handsets through infrastructure. Other manufacturers will be certified and demonstrate interoperability, he says, but Nortel stands alone for the moment.



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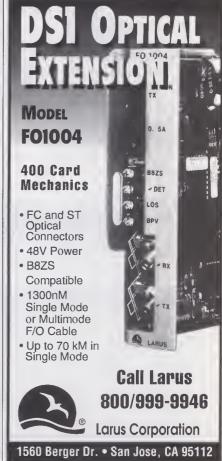


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#### WINSTAR BREAKS DOWN 'RADIO' MYTH

Vince Vittore Associate Editor

elling carriers on radio technology is a bit like selling cars with fins—it's something customers have tried before and moved away from, says Barbara Garrett, vice president-marketing of WinStar Telecommunications Group.

But if that analogy holds, expect to see old Chevys and Fords on the roads soon.

Since introducing its concept of wireless fiber, WinStar has signed up several carriers, particularly in the competitive local exchange market. The two latest are Teleport Communications Group (TCG) and Electric Lightwave, which will use WinStar's 38GHz links to extend their existing networks.

"It's been a re-education with the marketplace in the U.S. When you talk radio technology, everybody thinks microwave, and that's what everyone tried to get away from in the '80s by installing fiber," says Garrett, adding the technology has been used extensively in Europe by Mercury Communications.

WinStar transmits voice and data over wireless links at 38GHz. A typical link lets carriers extend four DS1s to a site. Each link is carried over a 100MHz channel and can provide bit error rates as low as 10-13.

#### **EASY UPGRADES**

Another big selling point: minimal time to upgrade from one or two DS1s to full capacity. In some cases, it can be done while the user waits on the phone.

The company also is joining the quickly

evolving T1/DS1 price wars, with single DS1s starting at about 10%-15% below telco rates.

TCG, the largest competitive provider, will use the service to connect a major Boston hospital's voice network to TCG's fiber loop. Electric Lightwave, a subsidiary of Citizens Utilities, committed to purchasing at least 100 T1 links over the next year.

The 38GHz technology, which can extend networks as much as five miles, seems natural for competitive providers who may not have physical plant everywhere they want to go. However, WinStar also is attempting to bring in local exchange carriers and PCS license holders. Currently, it is in discussions with two LECs and expects to have some as customers by yearend.

The company is hooking up some end users, though that is not a priority, says David Ackerman, executive vice president. "The logical mechanism is to leverage the other company's sales force because they have the relationships with end users. I see us as sort of like Dolby. Nobody buys a stereo from them, but everybody's got Dolby. We see ourselves as complementary to everyone."



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Aug. 22-2	4 DVC '95 Eost (Oesktop Videoconferencing Conference)	Secoucus NJ Hilton Meodowlonds	408-778-1994
Aug. 27-31 Aug. 29-31	1 South Eostern Telephone Association (SETA)	Atlanto GA Hilton and Towers	803-731-5640
	1 Incoming Coll Center Monogement	Orlando FL Marriott's Orlando World Center	800-265-5665
Sept. 2-7 5ept. 6-8	7 Western Rurol Telephone Association Convention	Anchoroge AK Sheroton	707-538-7755
		Son Antonio TX Morriott Riverwolk	202-298-2351
Sept. 10-1		Columbus OH Hyott on Copital Square	614-221-3231
Sept. 10-1		Hilton Heod SC Hyott Regency	407-695-7919
Sept. 10-1		Coeur d'Alene 10 Coeur d'Alene Resort	707-538-7755
Sept. 10-1		Voncouver, Conodo Conference Center	416-865-9993
Sept. 11-1		Chicogo IL The Westin Hotel O'Hore	201-256-0211
Sept. 11-1		Thompsonville MI Crystol Mountoin Resort	517-482-4166
Sept. 11-1		Wheeling WV Ogleboy Pork	304-684-1191
Sept. 11-		Stomford CT Stomford Sheroton	407-878-8200
Sept. 12-		Oollos TX Convention Center	800-829-3976
Sept. 12-		Voncouver, Conodo Trade and Convention Center	416-252-7791
Sept. 13-		Mexico City, Mexico Hotel Presidente	800-331-5706
Sept. 14-		Williomsburg VA Williomsburg Lodge	703-823-1555
Sept. 17-5		Son Oiego CA Convention Center/Morriott	909-945-1122
Sept. 19-2	·	New York NY Jocob K. Jovits Convention Center	800-829-2281
Sept. 21-2		Orlando FL Oronge County Convention Center	800-416-5521
Sept. 24-2		Morco Island FL Morriott Resort & Golf Club	202-298-2385
Sept. 25-7		Tucson AZ Sheroton	801-581-5809
Sept. 25-2		Atlanta GA Convention Center	800-468-3767
Sept. 26-2		Long Bronch NJ The Oceon Place Hilton Resort and Spo	301-975-2937
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Oct. 2	· · · · · · · · · · · · · · · · · · ·	Stevens Point WI Holidoy Inn	608-833-8866
Oct. 3-			-41 (22) 730-S811
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Oct. 10-		Atlantic City NJ Convention Center	609-848-1000
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Oct. 10-		Overland K5 Overland Pork Marriott/Trade Center	913-841-9241
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Oct. 16-1		Newport RI Newport Morriott	401-849-6771
Oct. 18-7		Tompo FL Convention Center	800-828-0420
Oct. 22-2		Konsos City MO Hyott Regency	913-234-0307
Oct. 23-2	1 ,	Minneopolis MN Minneopolis Morriott	602-948-8225
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Oct. 24-2		St. John NB St. John Trode and Convention Center	800-267-4529
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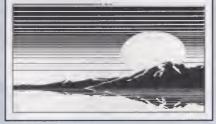
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## UNITED STATES EXPORTS TREND TOWARD COMPETITION

#### **Alan Pearce, Contributing Editor**

Competition has been a fundamental principle of U.S. telecom/information/entertainment industry policy for at least the past 25-30 years. Now that principle is being deployed rapidly in Europe, Latin America, Africa and Asia. Most major countries will have privatized at least their telecom service providers and opened up service and equipment markets to competition by the year 2000.

The pro-competitive trend began in the late 1950s in the U.S.; now the world is following the success story of the biggest and arguably most successful telecom/information/entertainment industry market.

Many countries are playing copycat and catch-up. The pro-competitive trend began in Europe with privatization of British Telecom (now BT) in the mid-1980s, quickly followed by European Union policies mandating privatization, competition and effective independent regulation beginning January 1998.

BT, Europe's third largest telephone company, is considered the model for successful privatization. But the British are first to admit they looked to the U.S. for guidance in privatizing BT, subjecting it to a regulatory regime and introducing competition to what became a burgeoning British telecom service market.

The trend is growing rapidly:

- Deutsche Telekom (DT), the German monopoly carrier, will begin to "sell" 49% of the company next year and expects to raise \$10 billion or more. DT is Europe's largest and most powerful telecom company.
- Stet, Italy's monopoly carrier, plans to sell a 61% stake for an estimated \$7 billion. Stet is Europe's fourth largest carrier.
- KPN, which serves the Netherlands, hopes to raise \$4 billion by selling about one-third of its ownership.

Others in the privatization queue include Matav (Hungary), SPT Telecom (Czech Republic), Belgacom (Belgium), Bezeq (Israel), PT Telkom (Indonesia), OTE (Greece), Telia (Sweden), Telkom (South Africa), Telecom Portugal, Turkish Telecom Corp., CANTV (Venezuela), the Telephone Organization of Thailand, India Telecom and Brazil Telecom. The rush is on.

The Clinton-Gore administration deserves at least some credit for the rapid adoption of competitive policies around the world. Vice President Gore has traveled the

globe talking up America's telecom success story and advocating the five fundamental political, policy and business principles of the Global Information Infrastructure:

- Private investment and privatization in all countries will be a prerequisite to open entry into the U.S. market;
- Other countries must expose their national telephone companies to domestic and foreign competition;
- A regulatory framework must be independent and cannot be the same entity that owns the telephone company;
- There must be open access for all on an equal and nondiscriminatory basis; and
- Universal service must be maintained.

#### **POLICY PROBLEMS**

Unfortunately, some major countries are posing policy problems:

- France Telecom (FT), Europe's second largest carrier, which should be privatized and subject to competition by 1998, apparently is dragging its feet, ignoring and opposing a European Union policy it helped create. President Chirac, while allegedly an advocate of privatization and competition, thus far has refused to move ahead with it, largely because of FT's management and work force opposition.
- Nippon Telephone and Telegraph (NTT), the world's biggest telecom carrier, is moving ever so slowly toward privatization, competition and openness. Many U.S. policy experts are beginning to advocate "stronger" tactics against Japan to hasten the process. Previous efforts to open the Japanese market have failed, although the Clinton-Gore administration has approached the problem with new fervor and determination,
- China, which represents the world's single biggest potential telecom market, remains unmovable.

These holdouts likely will follow American leadership because multinational corporations will demand it, and potentially dominant global companies such as FT and NTT will not survive without the flexibility to join global alliances. Under current U.S. policy, business flexibility (i.e., the freedom to invest in the U.S. and joint-venture with U.S. companies) will be denied FT and NTT unless the French and Japanese markets are opened up—fast.

The irreversible global policy momentum is toward more competition, privatization and open national and international markets. And for once, we can thank American leadership—a rare success story in global politics.

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